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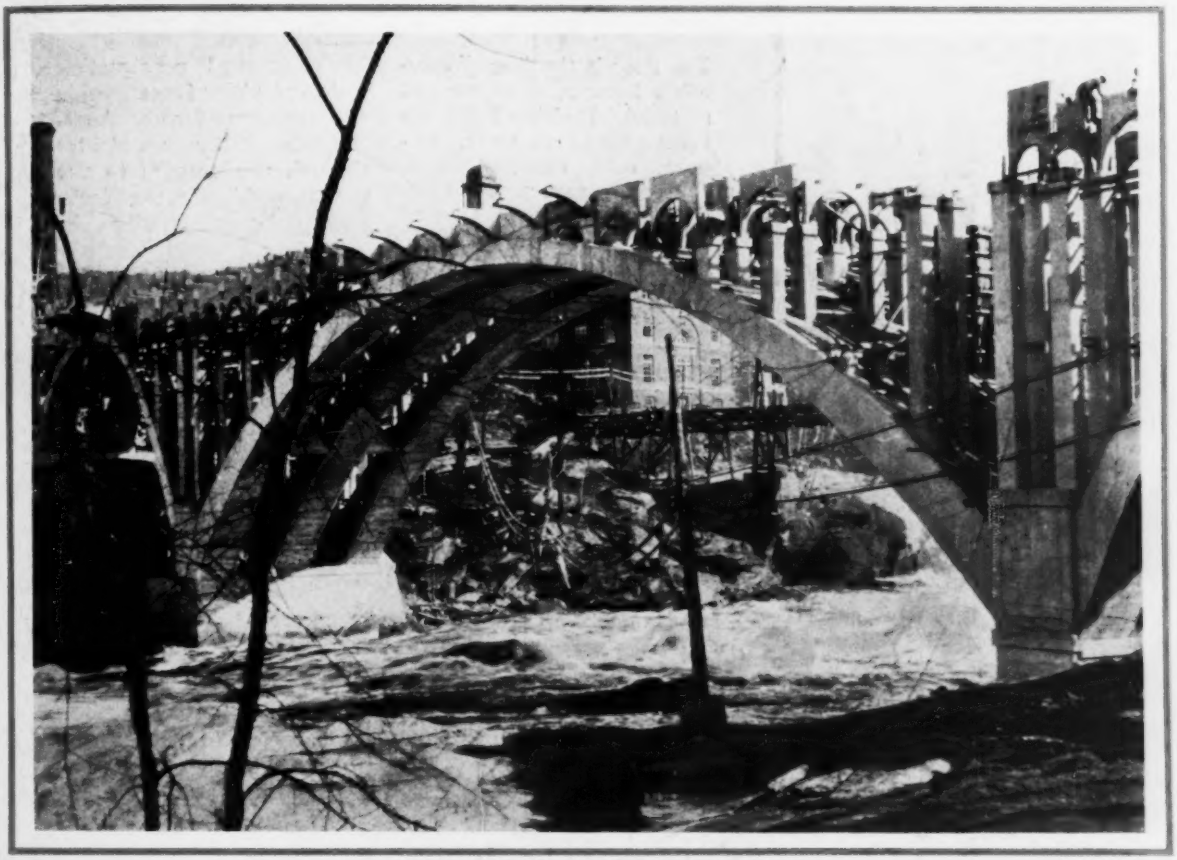

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First of Three Articles by Brig. Gen. Thomas H. Jackson
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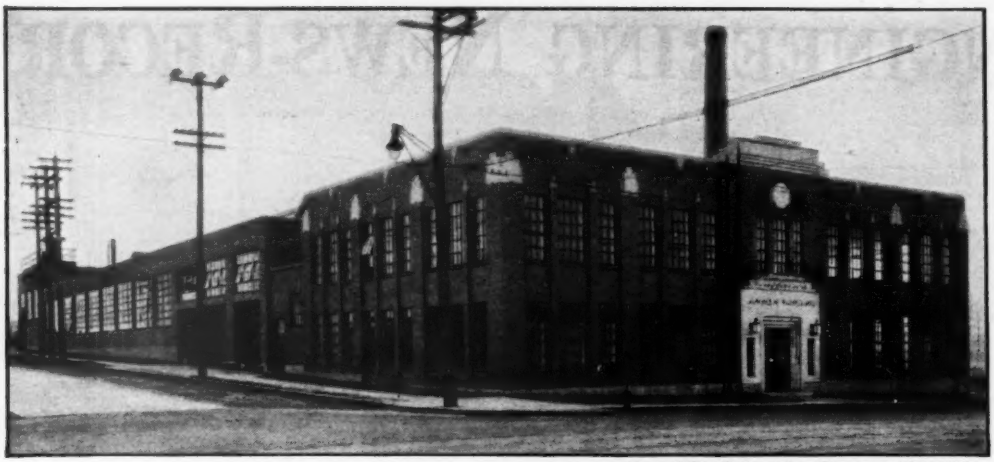

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F. E. SCHMITT, *Editor*

Volume 106 NEW YORK, JANUARY 8, 1931 Number 2

St. Lawrence Power

POWER development on the St. Lawrence River comes to the fore again with the preliminary announcement that the engineering board of New York State's St. Lawrence Power Development Commission favors a single-stage development of the international section of the river as opposed to the two-stage development advocated by the Canadian engineers. These engineering plans are but part of the commission's complete report, which is due on January 15. Interesting as they are, they are not as important as will be the commission's finding on the feasibility of undertaking the power development through a state-controlled agency and the findings of its market survey board. Engineering plans for power development on the St. Lawrence, prepared at intervals over a long period of years, are gathering dust in government archives and will continue to do so as long as the international and economic obstacles which stand in their way are not removed. Even the fact that the present engineering board figures that power can be produced by its plan at an appreciable saving over earlier proposals is of but academic interest if that price still is too high to make the power marketable, or if construction of any project is blocked by international or national politics. The market report is of primary interest at the moment. Its findings will measure the importance of the engineering report.

Flood Engineering

LEADING place is given in this issue to the first of three articles on flood engineering by Brigadier General T. H. Jackson, Corps of Engineers, U.S.A. Following this article on determining the problem and general engineering plan there will be an article discussing methods of flood protection and a third on flood-control works on the Mississippi River. As president of the Mississippi River Commission and as the engineer officer in charge of the great flood-control operations in the Mississippi Valley, General Jackson speaks from a position of authority which makes his statements important. Primarily the articles command attention as an expression in a single integral statement of the theory of flood control on alluvial rivers to which the experience of the army engineer corps has brought its leading thinkers. Incidentally also General Jackson's enumeration of principles and analysis of methods exhibit the reasoning which led to the official plan for flood control on the Mississippi River. To many engineers this will be the major element of interest, particularly as the official plan is now under review by the Chief of Engineers because of court injunctions which have estopped execution of the original plans for the two main diversions. Regardless of its particular application in the specific instance of Mississippi flood control, the discussion by General Jackson is a notable contribution to a subject on which there are few texts available.

Sewage and Agriculture

THE notes on sewage farming in Great Britain, France and Germany printed elsewhere in this issue review an old question, Is sewage farming good engineering? That question embraces many others, chief of which is this: Is sewage farming economically sound? And, in view of present excess agricultural production, is it warranted? Unfortunately we lack most of the data needed to answer these questions. Even the figures of revenue from the sewage farms of German cities quoted by Mr. Mitchell omit capital charges. In considering the extent to which sewage farming has been adopted, and in some cases abandoned, in various countries we need to know whether Great Britain stands alone in having forced sewage farming on inland cities regardless of the suitability of land available for the purpose, or whether cities have had a free hand in the matter, as in the United States. It would be interesting and probably instructive to know how many cities, the world over, have established sewage farms since the newer methods of sewage treatment became well established; also how much more rapidly the cities of Great Britain and continental Europe would have abandoned or supplemented by other methods their sewage farms had not the late war compelled them to continue their use as long as possible. Advocacy of sewage farming is perennial, and data for broad consideration are lacking. A thorough monograph on the subject would be a profitable study.

Ingenious Building

STANDARDIZATION has made ingenuity almost a legend in the building field. Tier upon tier, modern structures mount higher than their predecessors, but in basic elements and arrangements of these elements there is apparently not much latitude left for the designer. Now and then, however, traditional practice is broken and individual ingenuity shines through. The past year witnessed several noteworthy departures. Two of the most radical new things in building design are described in this issue. Both are located in Chicago, and, although in every sense special, they emphasize the fact that ingenuity in the building field is not an impossibility. One of these buildings, for the 1933 century of progress exhibition, involves the unique idea of supporting dome framework by hanging it from a system of suspension cables. Important economies in steel and in erection costs are claimed. The second building also is of dome type, but involves carrying the roof loads by groups of tall braced columns, arranged in concentric rings, to piers

which extend 124 ft. to bedrock. The building is to be used for religious purposes and certain symbolic arrangements were required that called for ingenious structural design of a high order. All such special structures are worthy of close study. They are indicative of the fact that ingenuity is still susceptible of profitable employment.

Organization Leadership Needed

TEN years' growth of organization in the construction industries has brought real and lasting progress. It has laid the foundation for a future single, united construction industry. Its most notable product, the Associated General Contractors, stands as fair testimony of what cooperative endeavor can accomplish. On the whole, however, the important fact confronts us that today, in an age of organized industry, construction in its entirety lacks integration into one unified interest.

Existing associations in the field of construction express only group interests. The groups are separated by mutual jealousies, and no group is agreed entirely even within its own councils. At this time, therefore, when construction activities are looked to as the most immediate means of relieving unemployment and stimulating depressed business life, construction is without an inspiring program or a concerted voice to proclaim it. No unity of plan, purpose or action exists to stabilize public thought and direct floundering legislation. The only encouraging fact is that deep in the welter of indirection and cross-purposes the industry is striving to organize its ranks.

As the meeting point of all the other groups, the contracting group is in ideal position to take leadership in this work of organization. Its central forum, the Associated General Contractors, gives it a strong national character. With widely distributed membership and much accomplishment in coordinating individualistic and highly competitive business units, it may justly claim the strength entitling it to leadership. Thus it is in a strong position to undertake the greater organizing task. The coming convention of the Associated General Contractors creates opportunity to prepare for the task. If the opportunity be not seized, the work may be taken up by stronger hands, for group and local organization of construction has gone as far as it can.

In the decade of its existence the Associated General Contractors has become a power in construction-group organization. With respect to the great work before it, however, the association has the weakness that group thinking dominates its actions. In the greater task of leading a federation of the construction industry it must extend its thinking beyond group interests and purposes. That it is able to do so has been proved by its conception and development of the affiliated bureaus of the surety bonding companies and the mixer manufacturers, and its coordinated credit work with the building subcontracting trade organizations. But where it has essayed to combat individual abuses and campaign for local causes, it has done little more than create misunderstandings and rouse hostilities.

The great present opportunity of associated contracting is to organize construction, of which it is the central element. This it cannot do if its national organization continues to make national policies of local questions and handle chapter problems as a national body. It cannot do it by espousing without sufficiently considered thinking every individual or local grievance which enlists sympathy. It can do it by coordinating other elements of the construction industry with contracting in the practice of principles which improve construction relationships.

Most of all things, organized contracting needs inspired management. The Associated General Contractors needs constructive leadership. This cannot be obtained nor should it be expected from voluntary part-time service of men engaged in business of their own in so intensely competitive a field as construction. The association has asked over-much service from a few during all its history, and though these few have given willingly unsatisfactory results were inevitable. With high leadership the association can do the needed thing of organizing a federated construction industry. It has the elements of a sound organization, supported by years of valuable experience and based on a membership of high quality. So soon as it perfects its operating structure and directs its aim toward the high ideal of a unified national construction industry, the task will be ready for its hands.

Railroad Consolidation Prospects

AGREEMENT between the heads of the Eastern trunkline railways upon the general outline of a plan for consolidating all railroads in their territory into four systems marks a long step forward in the movement to consolidate all our railroads into a limited number of large systems. But it is only one step. Many more need to be taken before the objective is reached, and some of them are even more difficult of accomplishment than the one just taken.

The present agreement covers railways serving only a part of the whole country; the railways of a much larger part still have to be made the subject of similar agreements. Further, the present agreement has to meet with the Interstate Commerce Commission's approval. The men who made it must be able to demonstrate to the commission that the realignment which they propose is in the public's interest, not a juggling of control for the benefit of a few large stockholders of the railways involved. One condition which must be satisfied to obtain the commission's approval is that provision be made for the small and weak lines tributary to the four proposed railway systems. They must be absorbed into the larger systems under conditions fair to the present owners, the prospective owners and the public. This alone raises questions which can hardly be answered without long delay and added legislation.

A reduction in transportation costs, either direct or indirect, is a primary motive behind railroad consolidation planning. If wasteful competition can be eliminated without complete loss of the stimulus and check of competition; if rate structures can be simplified and more direct routing of freight made possible, without undue disadvantage to too many shippers; if operating costs can be reduced through the elimination of duplicate facilities or the wider use of joint facilities and the more efficient use of the existing plant; if small railways can be rescued from abandonment or made more serviceable to their communities through the introduction of modern equipment; and if capital charges can be reduced through a simplification of finance, then the country as a whole stands to gain measurably from the present consolidation movement.

Were there no deterring factors there would be little question as to the practical advantage of many of the theoretical considerations. But many factors operate

against their practical application. There are, for example, many cities now having advantages in freight rates gained through competitive bargaining in the past, and other cities in which are now located the main offices, terminal facilities or shops of smaller roads, all of which may be moved away under the projected consolidation. The labor organizations, particularly at this time, are opposed to the abandonment of duplicate facilities or any similar changes which might result in a reduction of labor forces. Both the cities and the labor organizations, therefore, will be heard in legislative halls in opposition to the consolidation plan. They may not block the project but are bound to hedge it round with costly restrictions.

Outside of legislative halls other groups will be doing their bit toward cutting down the possible advantages of consolidation. They will be made up of the stockholders of short lines which must be absorbed by the larger systems. Knowing that absorption of their lines is a condition to the general scheme, they will expect the trunk lines to pay handsomely for their stock. Here is where new legislation is needed. Minority groups of stockholders of the small railways now have the power to nullify many of the expected economies from the setting up of the larger systems.

With these and other factors working to reduce the possible benefit of consolidation no general lowering of the freight rates may result, but if consolidation does no more than put the railroads into a position for handling the country's freight more expeditiously and efficiently, if it results in an improvement of their financial condition to a point where part of the thinking now concentrated on making income meet outlay can be devoted to developing more complete and efficient transportation systems, then the projected consolidations are well worth undertaking.

Forecast and Counsel

"THERE is no doubt that we are near the bottom of this depression and that the early months of 1931 will see the beginning of gradual recovery." This encouraging statement was made to the Railway Business Association recently by the noted economist Virgil Jordan. But the speaker accompanied this forecast with a grave warning. His reasoning and advice invite universal attention.

Back of the warning is Dr. Jordan's conviction, which on reflection everyone is likely to share, that good and bad business depends upon men rather than upon remote and intangible external factors. In times like those of the past year, when the individual feels that he cannot make headway against the general downward drift, he is inclined to lay the blame on outside conditions—on the alleged gold shortage, for example, or on worldwide overproduction. Not only did Dr. Jordan take a firm stand against such fatalism but in particular he opposed the charge of overproduction, "this myth of general overproduction," which, he said, "has become the superstition of the age." He pointed out plainly that, were overproduction really the source of our troubles, we ought to proceed at once to destroy our idle industrial plants, partly occupied buildings, and railroads that are not operating at capacity, since all such facilities have no justification unless they serve to support existence and advance the future standards of living. Common sense tells us that they should not be destroyed, because all that they produce will find eager takers so soon as we devise methods for distributing products to consumers.

Nevertheless the present situation has critical significance. We are at a turning point in the history of our business and social system. To quote:

> The 1930 depression is subjecting the institutions of the Western world to a crucial test, and it presents to business and financial leadership the most impressive challenge it has ever met. There is everywhere today a persistent perplexity and insistent skepticism about the soundness of the business system under which such an experience has been possible, and about the adequacy of the experience which failed to prevent it. The value and reality of the industrial achievements of the past ten years and the ability of maintaining and adding to them in the future are being doubted. In consequence of what is justly felt to be a flagrant betrayal of trust there has been in this country a growing loss of thinking ability or willingness of business and financial leaders to preserve those standards of living which the progress of the past decade has provided.
>
> If the fairly regular recurrence of one year of poor business out of three in the past is any indication of the chronic instability of our economic system, we shall have to face the issue and meet the challenge again, in a few years more or less. And if the past is any guide, each of these successive shocks to our business structure will be more severe than the last, and will put a more intense strain upon the faith of the mass of men here and abroad in the soundness of that system and the efficacy of its leaders. Unless we heed the warning which this latest experience gives, and prepare now to meet the issue it raises and the challenge it puts, we may not be able to do so when we find ourselves at the next turn of the road.

Against this background Dr. Jordan outlined two recommendations. The first is that living standards be maintained. This means holding firmly not only to wage rates but also to employment schedules, in order that the individual's income total shall be preserved. It means also holding to prices based—with fair but not exorbitant margins—on production costs at current wage levels. Unless these things be done, deflation and liquidation are bound to progress, with consequences of utmost gravity.

But, second, and in the long run of overshadowing importance, is stabilization of growth by farsighted advance planning of business policy. Industrial progress will not get very far unless its leaders take the longer view ahead and plan their operations on a definite schedule. What this involves is more than merely looking ahead and conceiving a hazy picture of the five-year-off product, or business volume, or system of organization, or equipment requirements. It means a definite budgeting of all steps from financing to purchasing, from development of product to employment and equipment scheduling. By such a program, laid out for three to five years ahead and revised each year, an industry can remove from its business operations their present temperamental fluctuations which lead to cyclic booms and depressions.

A veteran of railroad motive power service said a few weeks ago that savings of astonishing amount could be realized were the railroads merely to exchange information about their locomotive requirements and equalize their orders accordingly. The logic of his statement is obvious, and equally obvious is the fact that similar abandonment of mob psychology in all other activities of business would break the waves of optimistic inflation and pessimistic depression which bring trouble to all ranks of humanity.

It is this that the Jordan recommendations aim to accomplish. For effective application, evidently, they require industrywide or countrywide adoption. There is obvious place, also, for business cooperation through trade associations and for joint action by management and labor. In final analysis, however, their virtue depends on the individual. As he comes to understand and apply them, his action will help to place our economic life on the higher plane necessary for stability and continued growth.

Flood Control on Alluvial Rivers—I

By T. H. JACKSON
Brigadier General, Corps of Engineers,
President Mississippi River Commission, Vicksburg, Miss.

A Survey in Three Articles of the Planning Problems, Methods of Flood Control and Types of Flood-Protection Works, With Particular Reference to Flood Control on the Mississippi River

✦

INTRODUCTION

THE PROGRESS in developing a flood-specialty group of engineers in this country has not been in keeping with the importance of the flood problem. Very little has been done by those training institutions which ordinarily co-operate, if they do not indeed lead, in the development of specialty groups. These statements are not reflections on the profession or on the training institutions; the opportunities to gain broad flood experience in the field are most limited because the comprehensive consideration of the flood problems of major rivers has seldom been in the hands of any agency other than the Corps of Engineers of the army.

In connection with its operations for navigation and flood control, the Corps of Engineers has contributed considerably toward the development of a flood-specialist group. The contribution has grown in importance since the initiation of recent extensive flood operations. These operations comprise: (1) the approved projects for the control of the floods of the Mississippi River and of the Sacramento River at a cost of about $350,000,000; and (2) the extensive river surveys authorized by Congress in the acts of June 21, 1927, and May 15, 1928. About $12,000,000 has been made available for these surveys, which cover the problems of flood, power, irrigation and navigation of practically every important river in this country. The bulk of effort of these surveys will undoubtedly be directed toward flood problems. Incidentally, this is the most extensive and comprehensive waterway study ever undertaken in the world.

These projects and flood studies are offering to hundreds of engineers an opportunity to gain practicable and theoretical training in certain phases of flood engineering, and, to a number, some training in all phases. The Engineer School of Application, at which the officers of the Corps of Engineers receive their post-graduate training in military and river and harbor engineering, is adding to the information obtained by officers in actual practice by developing the theoretical side of flood engineering; it has already established a course on that subject.

When the flood surveys and studies referred to above have been made, and there are returned to civil employment those engineers who have had field experience, it is hoped that they will become a nucleus of a strong flood-specialty group. It is hoped further that a few at least of our great engineering schools will awaken to the importance of emphasizing this specialty and will establish courses in flood engineering. This last is particularly desirable, for until it is done there is little prospect of the development of the texts which are so necessary.

At present there is a great lack of texts which deal with flood engineering in a comprehensive manner. Few articles have discussed the subject other than in parts; these have given much that is sound on levees, revetments, clearings, reservoirs, hydraulics, etc., but flood engineering goes farther. It deals with basic principles, methods, etc. It takes into account all of the elements that must be known in solving the flood problem of a major stream, in preparing the engineering plan, and in carrying out and maintaining that plan.

For many years the writer has given much of his time to the study of flood problems and their solution. These studies have covered in whole or part many of the great flood rivers of this country—Sacramento, San Joaquin, Lower Colorado, Brazos, Trinity, Neches, Sabine and the Mississippi, including practically all its major tributaries. He has learned much from contact with others who have gone before or with him. He has felt, and more acutely probably than any other engineer of today, the absence in published form of established principles, methods, etc., such as are available to the engineer who labors with other outstanding problems.

No one can enter at all deeply into the flood problems of today without realizing that the time is now ripe for the profession to give them careful consideration; to acquire general knowledge of what is sound and to take an active part in directing public opinion. Public opinion concerning floods and flood-control methods has been based mainly on theories, principles, methods, etc., which are neither sound nor supported by the facts. In many instances they have been advanced by individuals through selfish interest. Many have had the support of those engineers who form their opinions on technical subjects of which they have no technical knowledge from non-technical sources. The engineering profession has far to go in setting the public opinion right; it will do so when it has set itself right.

In the business world public opinion is not nearly so serious a matter as in public affairs, for in the latter

legislative or other similar bodies seldom have any technical knowledge and must therefore lean on the technical professions. When a technical profession fails to give them good advice, there can be no criticism of their actions, no matter how unsound they may be.

The articles which follow in this and succeeding issues have been prepared first in the hope that they may be a useful contribution to flood-engineering literature from a technical and practical standpoint, and second, that they may assist many who, while not acquainted with what is sound, are honestly seeking such knowledge. It is hoped that they may serve to clarify somewhat a picture of an important branch of civil engineering that at present is very confusing.

Determining the Problem and General Engineering Plan

FLOOD ENGINEERING is that branch of civil engineering which deals with the determination of flood problems, the preparation of plans for the solution of such problems, the carrying out of such plans and the maintenance of the completed work.

The determination of the flood problem of a river involves knowledge of the topography of the area subject to flood; knowledge of the frequency, magnitude and duration of the floods, and knowledge of the location, nature and extent of the flood damages.

The preparation of a plan for the control of the floods of a river involves knowledge of general river characteristics; knowledge of the special characteristics of the river under consideration; knowledge of the river's flood problems and a broad knowledge of general flood-control methods.

The carrying out of a flood-control plan involves knowledge of the topographic data necessary for the actual locating of the flood-control works; knowledge of the design of flood-control works and knowledge of construction of flood-control works.

The maintenance of a completed flood-control plan involves knowledge of river-stage prediction; knowledge of the construction and the repair of flood-control works and knowledge of flood-fighting methods.

In approaching the solution of the flood problem of a river the normal procedure should be about as follows:

1. A general study should be made of the existing topographic flood discharge, and flood-damage data with the view of determining the location and magnitude of the flood problem.

2. A general plan with cost for the solution of the flood problem should be prepared.

3. A careful comparison of the flood damages and the cost of this general plan should then be made to determine whether or not there is economic justification for the solution of the flood problem in whole or in part.

4. If the decision under 3 above is favorable, there should then be made a detailed study, and from this study there should be prepared a detailed plan with costs.

5. A comparison of the cost of the detailed plan under 4 above with the estimated flood damages, past and prospective, should show whether or not there is economic justification for the adoption of that plan. Pursuance of the above method permits the consideration of the flood problem of a river and the preparation of a plan that may be economically justified, to be accomplished with a minimum of expenditure of time and money. Furthermore, while giving all necessary consideration to the flood problem, it permits the termination of attempts at its solution as soon as a solution is shown not to be economically justified. Naturally it must be assumed that there is in general no justification for the preparation of a detailed plan where the carrying out of the general plan is not economically justified.

The first requirements for determining the flood prob-

A Caving Bank at Riverton Landing, Miss.

Height of bank can be estimated by height of men shown at left. Toe of slope is probably 60 ft. below the water surface.

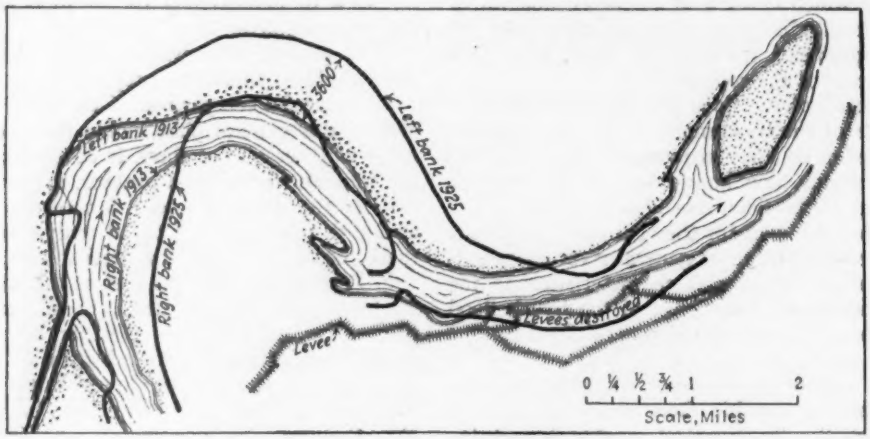
lem of a river are: (1) data on the topography of the flood area; (2) data on flood frequency, magnitude and duration; and (3) data on flood damages. General methods of securing these data are now considered.

Data on Topography—In the study of the flood problem of a river it will be found, in general, that sufficient topographic data are not available for a determination of the class and extent of the areas subject to floods, or to permit the preparation of a flood plan. The necessary data can be obtained only by additional field work. For the initial and general study referred to under 1 above, the field work should be limited. However, should it be decided to prepare the detail plan referred to under 4 above, there must be such mapping as will cover the river channel and the areas where the flood works may be located.

Field surveys for flood-control planning should always be made by the traverse method, and the map should show all elevations obtained. The frequency, length, etc., of the traverses should be determined by the importance of the problem. The following may be safely assumed as normal: traverses extending across the entire flood plain at intervals of 3 to 5 miles; intermediate traverses 1 mile apart covering the area, including the river channel, between probable levee locations; traverses ½ mile apart extending from top of bank to the probable levee sites. The control should be located on a bank. The accuracy of the vertical control need not be greater than the second order; that for the horizontal control should not exceed that which is possible, using the second order primary-traverse method. Most of the horizontal control will be obtained using the third order. The vegetation and the location of the drainage systems can be obtained, at least cost, by aerial photography thoroughly controlled. The scale of the map should be at least 1:10,560. With such a scale additional details can be shown where special conditions may warrant.

It should be kept in mind always that the important area is that between the probable levee locations. The remainder of the overflow plain comes into the picture only in connection with the determination of flooded area, damages, etc.; except where the diversion method of control is probable. If diversions are to form a part of the plan, it is necessary that their probable locations be covered with the same accuracy as the area between the main river levees.

The area of the flood plain is always large, and to map it accurately on a large scale means a larger expenditure than is ordinarily justified or needed. The solution of the problem does not require such a map, and any topographic work in addition to that actually needed is an unjustified expenditure. It is believed that the same idea of economy should be exercised in the preparation of a plan for the control of the floods of a river as should be exercised in the carrying out of the plan. There is a very widespread opinion, and one widely fostered by the engineering profession, that a flood plan cannot be prepared without a detailed topographic survey of the entire area affected. That such an opinion is erroneous is evident from the fact that only a very limited portion of the entire flood area ever enters the picture in an important way in the preparation of a plan. Such being the case, the mapping should be on the basis of needs only.



Typical River Action at Caving Bends

Mississippi River at Paw Paw Island near Vicksburg, Miss. The heavy black lines indicate the location of river in 1925.

Flood Data—It is seldom, if ever, that there are available the data necessary for determining with the desired accuracy the frequency, magnitude and duration of a river's floods. If such data are not available, then the best possible use must be made of the data that do exist, since it is obviously impracticable to await the securing of all desirable data by means of discharge observations. Most alluvial rivers can be expected to have a bankful stage practically every year, a destructive flood every three to six years, and a great flood every 25 to 50 years. This shows the duration of time necessary to obtain a record of a river's floods complete enough to give a correct picture of what is to be expected.

For nearly every river there are available some flood records. While they may not be for very high stages, they are of great value as a check on the data that may be obtained later by stream gaging or indirect methods. There are nearly always available, for some or all critical points, gage-height data extending over a considerable period. These data give vaulable and reliable information regarding flood frequency, duration and magnitude. There are practically always rainfall data at points on the river's watershed. These data are very useful in checking the discharge that may be obtained for any given area or areas with the known discharge of another area for which the rainfall data are available. All existing gage, discharge and rainfall data should be collected and then supplemented by field observations to the great-

est extent possible or desirable, during the life of the study.

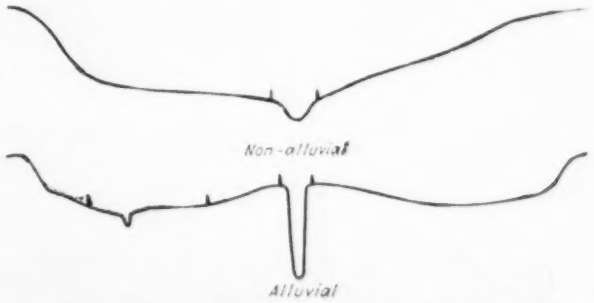
In the absence of definite data at any point, the discharge for any known flood stage can be determined approximately by use of the existing topographic data covering slope, cross-section, vegetation, etc. Data obtained in this manner should be checked by all other available data.

The importance of the flood data cannot be overestimated. This is because the discharge determines the capacity to be provided by means of levees, reservoirs, etc.; the height of flow determines the levee height and the duration, reservoir capacity and levee section. If the discharge is in doubt, then the capacity factor of safety must be increased; and since flood works are very expensive it is most desirable that this particular factor be held low.

The frequency of a flood enters the picture in the consideration of the economic justification of any plan proposed for its control. This is because the flood losses are dependent largely on the frequency of the flood against which protection is to be given. In other words, there may be economic justification in providing for the control of the ordinary flood which occurs about once every five years, and none whatever in providing for the control of the great flood that occurs every 25 to 50 years.

The outstanding feature of past flood-control efforts has been the underestimating of the discharge of both the ordinary and the great floods. In consequence, practically every attempt to control the floods of rivers in the past has been an economic failure.

The duration of the flood to be provided against must be given careful consideration in determining the capacity to be provided for reservoirs and the cross-section to be provided for levees.



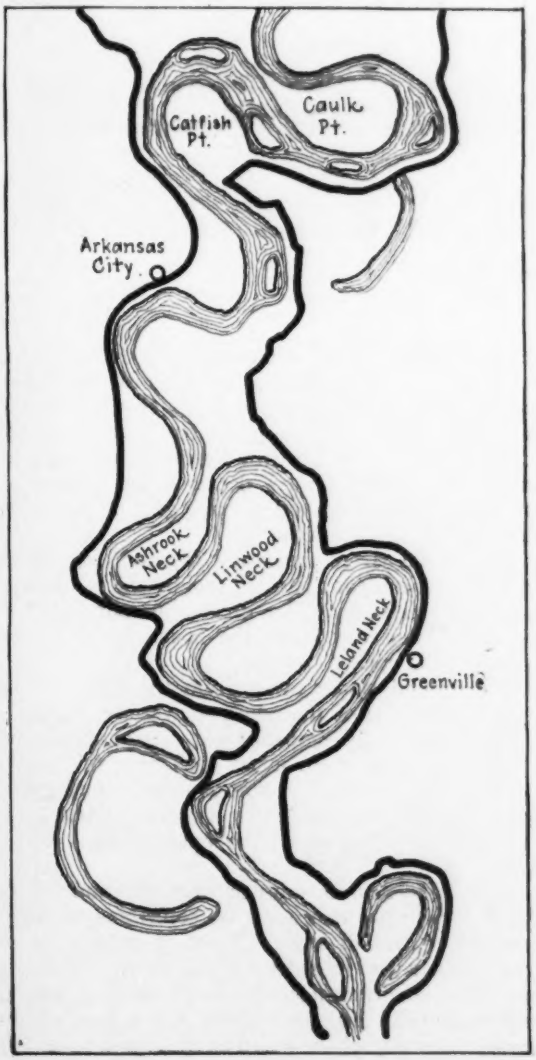
Cross-Sections of Alluvial and Non-Alluvial River Valleys

All interests having any connection with the water problems of a flood river should be encouraged to aid in securing accurate flood data, if only to the extent of maintaining river gages.

Flood Damages—What has been said regarding the unreliability of existing flood data applies equally to the existing flood-damage data. Rarely, if ever, are many data found covering the flood damages of a river. Furthermore, what exists is apt to be very unreliable, since it is seldom that any effort is made to collect it until long after the flood has occurred. When collected at a later date it is usually for the purpose of exploitation. Under such conditions there is a great tendency to exaggerate flood losses. To complicate the situation further, estimates are usually made by agencies not at all qualified by training to make them. In certain sections of the country the only available data covering past floods are those prepared by the United States Weather Bureau, but even these data cannot be classed as reliable. This is, however, no reflection upon the Weather Bureau. At best, the collection of flood-damage data is a difficult task requiring the services of highly trained specialists. The collection of meteorological data is the primary function of this bureau. Its personnel cannot be expected to be proficient in the collection of economic data such as flood damages.

However, where the estimates of flood losses are high rather than low, and such appears in general to be the case with existing records, a finding that a flood-control plan is unjustified economically should be all the more conclusive. Interests situated in localities where a flood problem exists should always be encouraged to undertake the securing of flood-damage data.

The normal procedure in determining flood damages is to ascertain as soon as the flood is past the extent and nature of the area overflowed, and as far as possible the actual injury caused by the flood. For agri-



Sinuous Course of Mississippi Between Arkansas City and Greenville

The crescent-shaped lakes of the Mississippi and other alluvial rivers are the results of cutoffs across the narrow necks between alternate bends.

cultural lands this survey must be supplemented at the end of the season by another to show what agricultural losses, if any, have in fact resulted from the overflow. This double agricultural survey is necessary on account of the tendency to assume, in estimating flood losses, that the flood has caused a complete crop loss for the entire cultivated area overflowed. As a matter of fact, that loss varies from 0 to 100 per cent, depending on many local conditions, including time of flood, industry of inhabitants, etc.

Preparation of Plan

Rivers have many characteristics in common, and because of this knowledge gained in the study or treatment of one may be used in the treatment of another to the extent that the two are alike. This is particularly true if they are of the same class. A knowledge of general river characteristics is therefore essential in approaching the flood problem of any particular stream.

From a standpoint of floods, rivers divide naturally into two classes: non-alluvial and alluvial.

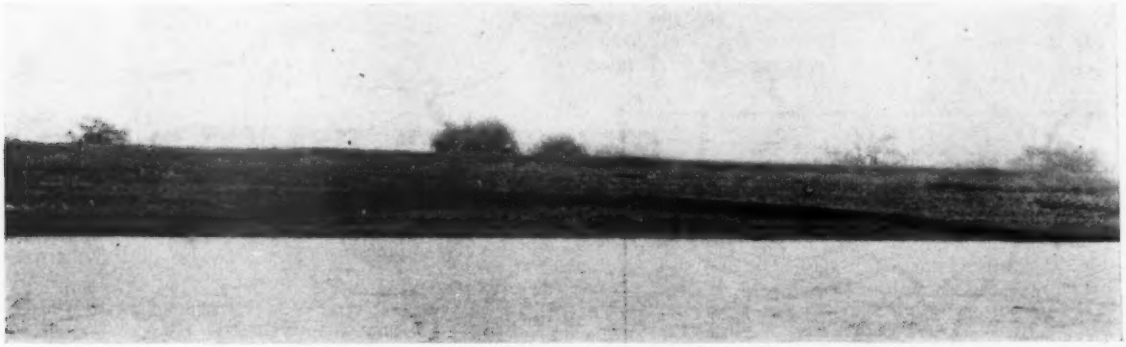
The non-alluvial river is one that has created its present valley and channel by excavation. The alluvial river is one which has built up its valley, in part at least, with material brought down by its floodwaters and deposited out of the channel when the banks were overflowed.

The non-alluvial river has banks lower than the adjacent country, which slopes upward and away from the river banks. The alluvial river has banks higher than the adjacent country, which slopes downwards and away from the banks for some distance, in some cases many miles, before the general upward slope begins. The non-alluvial river normally carries in its channel all or the greater portion of its floodwaters. It seldom has a serious flood problem. The alluvial river normally carries only part of its floodwater in the channel. It usually has a serious flood problem. The Mississippi River carried in its natural state (unleveed) in the latitude of Vicksburg about 1,000,000 cu.ft. per second. This is about one-half the ordinary flood and about one-third the maximum probable flood. The Sacramento River at a corresponding point carried in its natural state about one-tenth its maximum probable flood.

Below there are given certain important characteristics of an alluvial river:

1. The floodwaters which cannot be carried in the main channel escape over or through the river banks to the adjacent valley areas and flow over such areas parallel to the main river. These overflow areas are called basins. In general, the water flowing through the basins is returned later to the main stream. In some cases however, particularly in the lower reaches of the river, the water may not all be returned to the main river but may be discharged into an adjacent waterway. The Mississippi River affords such an example in the Atchafalaya Basin.

2. The capacity of the flood channel of a river is determined by the frequency and the duration of the bankfull stage. For this reason any removal of its floodwaters by diversion or storage which decreases the frequency and duration of the bankfull stages (or levee-full stages) will bring about a decrease in the channel capacity. Similarly, any addition of floodwaters which increases the frequency and the duration of the bankfull stages will produce an increase in the channel capacity. This important characteristic seldom receives proper consideration in connection with diversions, dredging and clearing. Diversions always decrease the channel capacity below. Dredging and clearing give no permanent increase in channel capacity.



Pocket Caving Threatens Levee
This hazard calls for a wide batture between levee and river bank.

3. All alluvial rivers are heavy silt carriers, and the greater the silt content the more rapidly the river builds up its banks and valley. The greater the portion of the heavy silt content the faster the banks build up with reference to the valley.

4. The ground slopes away from the banks of the river to the troughs of the adjacent overflow basins.

5. The width between banks remains approximately constant so long as there is no change in the natural flow. This follows directly from 2 above. Any cutting away of one bank is followed by a corresponding building up and advancement of the opposite bank of the river.

6. The frequency, magnitude and duration of the floods of a river are dependent on something in nature beyond the control of man. There is nothing in the records of our rivers in general which shows any change in these three important flood-discharge elements through natural or artificial changes. Flood stages have steadily increased, however, where man has attempted to reclaim the natural overflow basins by the construction of levees along one or both banks of the river, reducing the broad natural floodway to one that may be limited by the river's banks. If the same flood is to be carried in a reduced

channel, it must be expected that there will be an increase in the elevation of the flood plane.

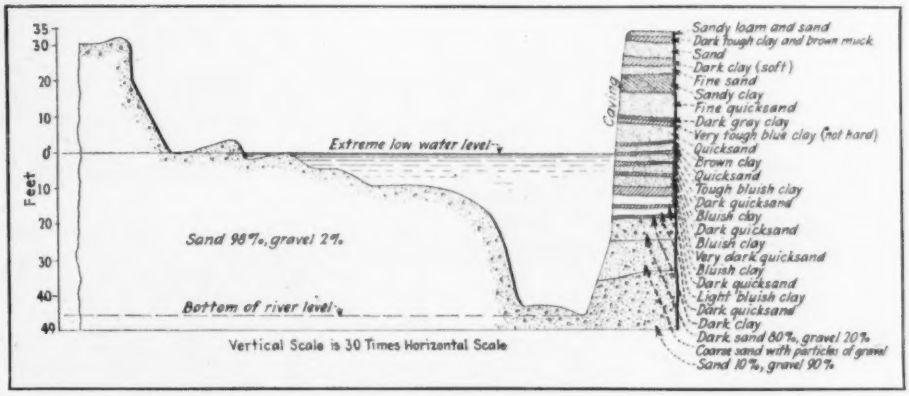
7. The rate of bank caving is determined by the character of the bank, the depth, the duration, the velocity, etc., of the flow. The rate of bank building is determined by the extent and duration of overflow, the quantity and character of sediment carried, etc. The net results are not complete loss of land. The average annual rate of bank cutting on the Mississippi River below Cairo is about 40 ft. The width of the river between banks averages about 4,800 ft., and there has been no material change in this average width within the knowledge of man.

8. The river channel moves laterally and slowly but surely back and forth over a portion of its valley. The river has undoubtedly covered all parts of its true alluvial valley many times. The rate of movement laterally is determined mainly by the maximum possible length of bend, which length is determined by the slope of the river in the vicinity of the bend, the frequency and duration of bank overflow and the general nature of the banks. The moving of the river in its valley is well pictured by the movements of a snake with pinioned head and tail.

9. In general, the lower portion of a bank is composed of layers of heavy material and the top portion of layers of fine material. As the river moves laterally in its valley there is cutting of bank on one side and a corresponding building up of a new bank on the opposite side. The composition of this new bank can be taken as characteristic of all the banks found in the same vicinity. First, there is a filling up of the channel during flood stages with heavy material (sand or gravel as the case may be) until the fill is above the low-water stage. Second, a growth starts on the exposed bar and, though it may be destroyed by the next flood, persists until the fill becomes high enough for it to survive a flood. This growth decreases the velocity of the floodflow and induces silt deposit. This building up by successive layers of deposited material continues until the normal bank height has been obtained. The characteristics of such a bank will be found to be similar to the one shown in section in the accompanying drawing.

10. The durability of a bank, or the resistance to the action of flowing water, decreases in about direct proportion to its distance from the mouth of the river. The slope of a river decreases from its source to its mouth with corresponding decrease in velocity of flow and sediment-carrying capacity. Thus, as the floodwaters of the river approach its mouth, they carry less and less coarse sediment, until finally they carry little except the finest clay. Where the river carries gravel and heavy sand, it is obvious from what has been said above regarding bank formation that the bank is easily eroded, particularly below the water surface.

It is of the utmost importance that there be full knowledge and appreciation of the above characteristics in preparing a flood plan and the plans for flood-control works. Those under 1, 2, 3, 4, 5 and 6 enter into the problem in connection with the height and the general location of the levees system; those under 4, 7, 8, 9 and 10 enter into the problem in connection with the designing and locating of levees, and bank protection.



Section Through Caving Bank at Plum Point Reach, Mississippi River
Note the layers of bank materials built up by succeeding overflows of the river.

Reference was made in the beginning to the mistaken ideas of the public and of many engineers regarding certain river characteristics. The most important and outstanding of these misconceptions relate to the characteristics outlined under 2, 5 and 6 above. The first is expressed in the statement that the river channels are deteriorating in flood-carrying capacity. It needs but a most casual study of our great flood rivers to show that this belief is absolutely unsupported by facts. The second is voiced by repeated statements in non-technical publications that as a result of bank erosion, great acreages are destroyed forever; and there is a demand for the elimination of this so-called "waste" by revetment of banks. There is nothing in existing records to show that on any alluvial stream there is an ultimate loss of land through bank caving (see 5 and 9 above). The third is the repeated and apparently widely believed statement that the floods of our great rivers are increased in frequency, duration and magnitude as a result of the actions of man. There are no data to support this erroneous belief.

It is to be regretted that there is such a general misconception of alluvial river characteristics, particularly of the three mentioned above, for theories that misguide the public, and particularly the engineering profession, on such important points cannot but complicate all attempts at sound and economic solutions.

The succeeding article will discuss the various accepted methods of flood control, including levees, reservoirs, diversion, dredging, clearing and the shortening of channels.

Three Cableways and Precast Units Speed Winter Bridge Construction

Each Arch Rib Served by an Independent Cableway—Precast Units Used for Small Sections Difficult to Mold in Place

By B. A. Wilder
Superintendent, L. E. McLaughlin, Inc., New London, Conn.

THE CONSTRUCTION of a concrete-arch road bridge costing $300,000, across the Androscoggin River at Rumford, Me., was greatly speeded up to meet the time limit of 45 weeks, including the three winter months, by: (1) using a separate cableway for each arch rib; (2) precasting units difficult to mold in place and setting them in cold weather when pouring was stopped; and (3) building a strong concrete pier and steel-girder substructure to hold the arch centers secure in swift fall and spring floodwaters. Briefly, concreting was begun Sept. 3, 1929, and was stopped for the winter on Dec. 1, 1929, when 4,500 cu.yd. had been placed. Setting the precast slabs was continued during the winter, and on April 1, 1930, pouring was resumed. The total 6,000 cu.yd. of concrete was completed by June 15, 1930.

Location and Structure

The bridge is located directly below a 30-ft. fall in the river where the channel is narrowed to 200 ft. The low-water flow is about 2,000 sec.-ft., which normally increases to about 20,000 sec.-ft. in the November high water; in the great high water of November, 1927, the flow was 54,000 sec.-ft.

Three arch spans and thirteen T-beam 28-ft. approach spans were called for in the plans. The arch spans are 85 ft., 200 ft., and 105 ft., the longest span being over the channel. Each arch has three ribs, each 6 ft. 5 in. wide, and each supports a double row of columns rising to the deck level and spanned between both ways by curtain walls with arched bottoms to simulate arches. The columns are spaced 11 ft. 11 in. c. to c. along the bridge and 4 ft. c. to c. across the bridge. Expansion joints ¼ in. wide separate the curtain walls from the columns where the two contact. Floorbeams cap the columns and the transverse curtain walls and extend beyond the outside arch ribs to carry sidewalks. The roadway deck is a 13-in. slab 30 ft. wide, on which a 6-in. concrete pavement is subsequently laid.

Because of approaching cold weather when work was started the contractor decided to expedite operations by installing a separate cableway for each arch rib. The three cableways had towers and a power house in common but were separately operating units in other respects. One was located over the center line of the middle rib and the others on lines just inside the faces of the outer ribs. All had 550-ft. spans, 1¼-in. track cables and ½-in. hauling and load lines. Electric power was used. A feature of the cableway operation was the use of a telephone line for each to convey signals from ten stations at which head sets with long extensions could be plugged in. This arrangement aided quick and flexible operation.

The cableways handled virtually all materials—excavation, centers, forms, reinforcement, precast slabs and mixed concrete. A mixing plant at one end discharged by belt conveyor into a hopper under the middle cableway, and a swiveling chute on this hopper enabled any of the three cableway buckets to be loaded. When this amount of concrete could be used, the mixing plant produced 150 cu.yd. a day with one ½-yd. mixer. Batching bins and an inundator were used. The gated concrete bucket is shown in Fig. 2.

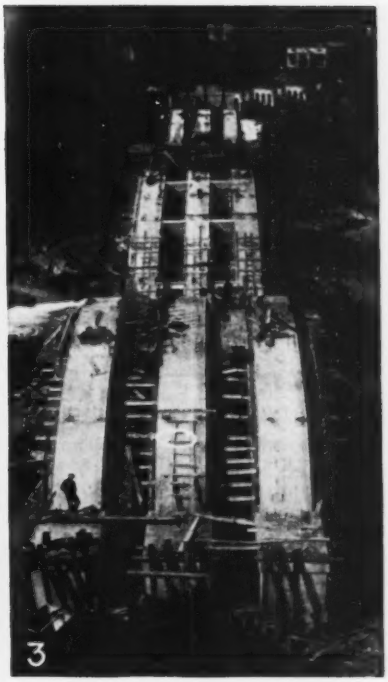
Construction of Arch Centers

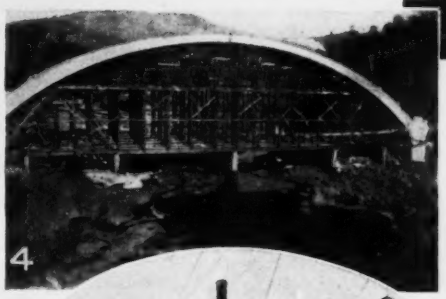
Decision to build the three ribs of three spans simultaneously called for virtually complete full-width centering. The certainty of swift current and autumn high water demanded strong centering especially for the 200-ft. main channel. The construction schedule called for immediate erection. Full steel centers were out of question because of cost and moreover they could not be fabricated as quickly as they were needed. A pole staging carrying arched trusses was decided on. For the side spans the pole staging was erected on the usual mud sills, but for the middle span a rather elaborate substructure was provided.

At the beginning of the work when the river was low, five concrete piers 2 ft. thick, 30 ft. long and 15 ft. high were built on the rock bottom under the center span. These piers carried two 50-ft. and two 35-ft. spans of 28-in. 145-lb. I-beams. There were six beams for each span, one under each line of poles and each truss center. The staging poles were 20 ft. high, capped transversely and crossbraced in both directions. The trusses were framed flat on shore and erected in assembled sections by the cableways. Center framing and substructure and the handling of assembled sections by cableway are shown by the illustrations. The ribs complete for all three spans were poured first. Column forms were then erected and the columns were poured. The succeeding step was the curtain walls of arched slabs.

The contractor and the engineers worked out a plan to precast the 250 curtain walls, since to pour them in place would have entailed much high falsework and complicated formwork. They were cast flat on platforms and then carried under the cableways by a specially built truck body containing a winch for lifting them. The cableways placed these curtain walls during cold weather when concrete operations were at a standstill.

The bridge was built under the direction of Max L. Wilder, bridge engineer for the state of Maine, with G. Bragdon as designer and Andrew Adams as resident engineer. L. F. McLaughlin, Inc., of New London, Conn., constructed the job, with L. E. McLaughlin as president and the writer as superintendent.





Construction Details for Three-Span Road Bridge at Rumford, Me.

(1) Typical structure of arch center; (2) gated concrete bucket for cableways; (3) completed ribs for three spans; (4) main arch center substructure; (5) cableway erecting section of truss center; (6) cableway placing curtain-wall casting; (7) arches with centers removed showing turbulent stream; (8) forms for curtain walls; (9) precast slabs and slab truck.

Observations on Sewage Farming in Europe

By George A. Mitchell
Sanitary Engineer, Vineland, N. J

American Engineer Visits Sewage Farms of Berlin and Other German Cities, Paris, Moscow, Edinburgh and Four Towns in England

SEWAGE IRRIGATION of crops has been practiced longer and more extensively in Europe than in the United States. The largest and best-known sewage farms in the world are those receiving the sewage of Paris and Berlin. Noteworthy but less well-known are the Moscow farms. England and Germany each has had, and probably Germany still has, a larger number of sewage farms, also more acres under sewage, than any other country in the world. Edinburgh in Scotland, Buntzlau in Germany and Milan, Italy, have applied sewage to crops for long periods, going back some two centuries in the case of Edinburgh. Naturally, these pioneer examples were primitive. As an art, the adoption and spread of sewage farming dates from about the middle of the last century, with England leading and Germany following closely. No large American city and, outside those parts of the West where irrigation is practiced, few small ones have taken up sewage farming, and many that did so gave it up after a few years. Institutional sewage has been applied to crops in the Eastern United States of late, and within a year or two the borough of Vineland, N. J., has established a sewage farm, as described by the writer in *Engineering News-Record*, Jan. 9, 1930, p. 65.

My long interest in the subject, intensified by what has lately come under my eye at Vineland, led me to visit a number of European sewage farms in July to September, 1929. Besides Paris, Berlin and Moscow, my trip included Münster, Dortmund, Celle, Salzwedel, Breslau and Darmstadt, in Germany; Edinburgh, Scotland; and Croydon, Cambridge, Leicester and Nottingham, England. This article deals specifically with some of the cities visited and generally with the others. It summarizes briefly a detailed survey of German sewage farming up to 1912; contains some observations on the hygienic aspects of putting sewage on crops, and closes with a discussion of the value of sewage irrigation for the United States, pointing to the difference between investment in equipment for artificial sewage treatment and investment in land for sewage farming.

German Experience and Practice

The cities of Germany are very successful with crop production under sewage irrigation, many of them having used this form of sewage disposal for 60 years. Münster, Dortmund, Celle, Berlin and Breslau appeared to be eminently successful from a farming standpoint.

Celle, a city of some 25,000 inhabitants, furnishes a striking example of vegetable growing under irrigation with screened sewage. The soil of the 50-acre farm was originally river sand. Some of this sand was in evidence across the creek from the farm and appeared absolutely sterile, no grass growing on it. The crops grown on the farm were: beans (different kinds), early and late potatoes, cabbage, carrots, kohl-rabi, celery (grown for the canning factory and not eaten raw), and leeks. The yields and prices in 1929 were: grosse bohnen (a large variety of bean), 5,000 or 6,000 lb. from 1,400 square meters; in great demand in Celle at 20 pf., or 4.76c. per pound (approximately $800 per acre). Carrots yielded 180,000 lb. per hectare in 1929 and sold at 10 pf. per bunch (1½ lb.), or over $1,000 per acre. In bulk at the canning factory they brought one-third less. Kohl-rabi brought $800 per acre, and celery and leeks considerably more than kohl-rabi.

At Darmstadt, in southwest Germany, there is a large area of very poor sandy land, privately owned, which is being converted into good farmland with the city sewage. The city has a sewage farm of 250 acres, and an association of farmers has been formed which controls the sewaging of some 600 acres additional of this originally poor land, some of which has received sewage since 1890. The association assesses the individual owners a small amount to keep up the ditches and is obligated to dispose of all the sewage not needed on the city farms. This land was worth $100 per acre in 1890 and is now worth $1,000 per acre.

Berlin Sewage Farms

For varied farming operations Berlin and Paris furnish examples. Dr. Heinrich Ruths, director of the Berlin sewage farms, stated that the Berlin farms supply one-quarter of the vegetables and one-sixth of the milk supply of the city's population of 4,800,000. The Berlin sewage farms cover 14,190 hectares (about 35,000 acres). Of this area, 8,560 hectares (some 21,100 acres), are ditched and irrigated.

A book by Dr. Ruths, recently published in Berlin, "Fünfzig Jahre Berliner Stadtgüter," or "Fifty Years of Sewage Disposal in Berlin," gives a complete history of sewage operations. The plans for the future are interesting from an agricultural as well as from a sanitary standpoint. The experimental treatment plant at Wassmannsdorff (one of the Berlin farms) was established for the purpose of finding the best method of removing a large part of the solids from the sewage before applying it to the land. Since raw or partly settled sewage reduces the permeability of soils there remains the choice of removing a large percentage of the solids or covering more land. Heretofore, the solids have been settled in more primitive ways. At Wassmannsdorff the sludge is sold to the farmers and gas is produced in more than sufficient quantity to operate the engines which pump a part of the sewage to another farm at a higher elevation.

It is intended to replace the settling ponds at all the Berlin sewage farms with some form of treatment plant, depending on results secured by experimentation.

The recent publication by Dr. Ruths, reporting the

income per hectare from the Berlin sewage farms, not including interest and amortization, gives the following figures down to 1926, to which I have added the figures for the next three years, obtained from Dr. Ruths by letter:

	Marks
Nine-year average, 1882 to 1890	16.16
Ten-year average, 1891 to 1900	5.04
Loss in 1911	—33.28
1912	23.92
1913	8.04
1914 to 1923 omitted as war and inflation years.	
	Reichmarks
1924	41.80
1925	52.08
1926	63.03
1927	65.84
1928	63.83
1929	76.79

The explanation given of the higher income from the sewage farms after the war, in spite of the agricultural depression in Germany, is that there has been freer management than was the case in the earlier years.

German Sewage Farm Survey Summarized

A careful and complete study of sewage irrigation in Germany, as practiced from 1908 to 1912, was made by Dr. J. Koenig and Dr. H. Lacour, of the Münster, Westphalia, agricultural experiment station, and published in *Landwirtschaftliche Jahrbücher* in 1914 (No. 4, p. 479). The authors describe sewage irrigation in 37 cities where sewage farms were established from 1871 to 1912. The population of these cities then ranged from 3,800 in Stadtilm to 2,214,000 in Berlin, and their combined population was over 5,000,000. (In 1929 Berlin alone had a population of 4,800,000, it having absorbed many of the cities that were suburbs in 1912, and in 1929 it had some 35,000 acres of sewage farms.) While in seven of the cities the sewage farms take sewage at the rate of 400 to 1,000 persons per acre of land, the average number is 133 per acre. It must be taken into consideration, however, that the acreage from which this calculation is made includes some unirrigated land. The number of persons per acre of actually irrigated land is probably considerably more than 133. The soil of northern Germany is sandy—some of it very sandy—and a large percentage of the sewage farms are located in this section of the country.

A comparison of crop yields on sewage irrigated farms in Germany with the average production on all ordinary farms for all Prussia shows a much higher yield of grass and fodder beets on the sewage irrigated farms. Of potatoes and grain, about the same average crops are obtained from sewage farms as from ordinary land. Crops of wheat were somewhat less on the sewage farms, but usually the soil of these farms is too light for wheat. Perhaps the best index of crop yields on sewage irrigated land is found in the fact that this land rents at four times the price per hectare that is obtainable for ordinary farm land.

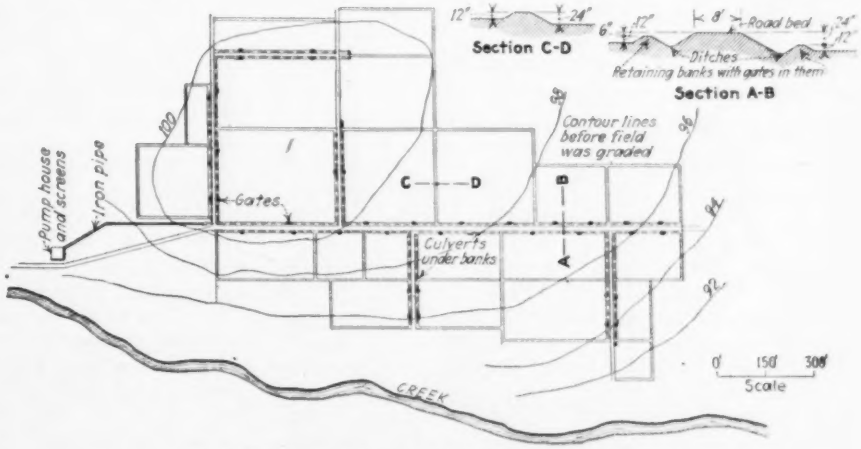
In answer to the question: "What is the range of the selling price per hectare of the sewage farm land?" Dr. Ruths' reply, freely translated, reads:

> Owing to the growth of the environs of greater Berlin a number of sewage farms are now within the city limits. This creates an extraordinarily valuable instrument in the hands of the city corporation for holding the price of lots for building purposes on a reasonable basis and thereby effectively preventing wild land speculation. Progressive building operators have considered the policy of purchasing more land, further from the city, for sewage farming, and setting free a part of the present sewage fields for building purposes. The price of the more distant sewage farm lands already in possession of the city is between 3,000 and 5,000 Rm. per hectare ($300 to $500 per acre). The prices of sewage farm lands now suitable for building lots range from 20,000 to 50,000 Rm. per hectare ($2,000 to $5,000 per acre).

Paris Sewage Farms

The Paris sewage farms are second in size to those of Berlin, having 13,600 acres in the four separate areas. At Paris large areas of land outside the municipal farms are sewage irrigated, and at the time of my visit, when droughty conditions were prevailing, the sewage was very much in demand by small farmers in the Pierrelaye area. At one place there appeared to be an argument as to how much each farmer should have.

The privately owned sewage farms of the Pierrelaye district and the large municipally owned and operated farms of the Achères tract were visited. At Pierrelaye, near the railroad, there were many small sewage irrigated farms on which vegetables were being grown. With the exception of a few examples crops were good and good farming was practiced. There were few weeds, except about the valves and where crops had ripened and had not yet been harvested—white potatoes, for instance. But there was plenty of evidence that only persistent weeding and cultivation kept the crops clean. The crops growing the last of August were string beans, pole beans, leeks, cabbage, carrots, mangolds, potatoes, beets, celery, fruit on trees and tomatoes.



Typical Layout of Sewage Farm in Continental Europe

The usual method of sewage irrigation in Europe is by flooding. The reason for such high banks is not clear. Immense quantities of earth were moved to grade many of these old sewer farms.

The soil is sandy and the slope is quite steep in many places, but there was no appreciable collection of sewage in ponds at the foot of slopes. It was evidently too valuable to be wasted.

The Achères tract is a municipally owned farm of some 3,700 acres. The city employs 60 men here, whose duties seem to be attending to distribution of the sewage, the upkeep of ditches and parks and such mechanical work as is needed on gates, pipe lines, drains, etc. The

scheme is private farming on municipally owned land under municipal control of sewage disposal. This is quite different from the organization at Celle, Nottingham or Moscow, where the entire ownership and operation is municipal or state.

The farmer pays the city a rental of 600 francs per hectare (about $10 per acre). Farm labor is to be had at $1.25 per day of nine hours. One farm of 243 hectares employs 300 men in summer and 60 in winter. Loads of vegetables were seen in the farmyard. Prices received were quoted as follows: two cabbages, 1 franc (4 cents); one bunch of carrots (14 large specimens), 2 francs; string beans (small), 3 francs per pound; string beans (large), 2 francs per pound.

Moscow Has Two Sewage Farms

Moscow has grown very rapidly under the Soviet régime. Under the Czar's rule only the higher parts of the city were sewered, and this sewage is carried by gravity to Lublin, where some of it is pumped to the higher land of the farm. The present population is 2,200,000, and about 60 per cent of the city is sewered, the sewage from the lower part of the city being pumped to Lubertzi, about 10 miles away. Lublin contains 1,200 hectares, and Lubertzi 1,000 (or 3,000 and 2,500 acres). Of the 5,500 acres total, 4,000 receives sewage, an average of over 300 people per acre. The peasants were hauling sewage in barrels to their land, but those in charge of the sewage disposal of Moscow said the objection to taking in more land for the sewage farm was that the peasants were liable to make trouble over this procedure. Apparently the tension between the country and the city, or, as our own newspapers say, between industry and agriculture, is greater in Russia than in the United States.

Sewage Farms Growing Fewer in England

Sewage irrigation of crops is on the decline in England although apparently not so in Germany or at Paris and Moscow. The decline in England seems to be due largely to the fact that the growth of the cities has rendered the original farms inadequate, sometimes bringing the suburbs too near the farms and more often because suitable land for extension or replacement is difficult or impossible to obtain at a reasonable price. Sandy soil is not common in England, as it is where sewage farming is most practiced on the continent, so large areas are required for sewage farming. I visited successful sewage farms at Croydon, Cambridge, Leicester and Nottingham. At Croydon the farm is receiving twice the amount of sewage that the farmer considers proper for best farming results (there are over 350 people per acre), yet there is no opportunity for expansion, since city and summer residences now border three sides of the farm, and the fourth side is a commons, which in England is the property of the public and cannot be used for any purpose except as a commons. In many cases the existing farms are needed for sludge disposal only. In all countries and particularly in England at the present time of slack business, there must be taken into consideration the constant pressure from engineers and salesmen to install new and expensive equipment.

Sewage Farming Not a Health Menace

As a result of 31 years' observation of the Croydon sewage farms in England, Dr. Alfred Carpenter, in the year 1891, made some sweeping assertions before the Third International Congress of Hygiene and Demography at London. While some of his conclusions are not in strict accord with the results of later scientific research, it appears that he maintains his position, which was that sewage irrigation at Croydon had shown itself free from danger to health during this period. In conclusion, he claimed to have proved, after a survey of every point bearing on the hygiene of sewage farming, that when carried out in the manner indicated it was a national advantage.

In the early years of modern sewage farming, investigations were made to determine whether bacteria are ever taken into the interior of plants. These tests showed that the interior tissue of plants remains free from bacteria however abundantly they are introduced into the soil. Rozyn, of Moscow, found B. tetani in the soil adhering to vegetables from the sewage farm but also on soil adhering to vegetables from gardens not sewage irrigated. Typhoid bacilli could not be found in 60 samples of soil from the sewage fields.

In Berlin, because of the theoretical possibilities of infection, investigations were made of cases of communicable diseases occurring on the sewage farms, especially typhoid. The authorities stated every time (to 1912) that no causal connection could be traced between the few cases that had occurred and the occupation of the patients. In 1889 there was a somewhat severe epidemic of typhoid fever in Berlin, but not one case of it was reported on the sewage farm.

The report of the metropolitan sewerage commission of New York contains the following: "The health of the people who live on the sewage farms is carefully watched. The records are published annually and confirm the belief that the sewage fields are satisfactory from a hygienic standpoint."

At the United States consular office in Paris I was told that the city was exceptionally free from typhoid fever.

At Nottingham, England, years ago, city authorities objected to the sale of milk from municipally operated sewage farms. With the assistance of the opinions of scientists, the farm manager was able to overcome the objections, and he has been supplying the city institutions with milk for some years. He stated that he thinks there would now be no trouble in selling his milk to the public if he had a sufficient supply to do so.

Replies made to the writer's questions while abroad, about objectionable features of sewage irrigation, showed none, as a rule, from either sanitary or esthetic standpoints. In one case it was stated that there was a suspicion that disease had once resulted from eating strawberries (presumably uncooked) from a sewage farm. This is the only case I have ever heard of where strawberries were grown on a sewage farm. It would appear that this is about the most undesirable crop to grow under such conditions, since if there is any possibility of germs attaching themselves to food it would occur with this crop if the sewage were allowed to come close to the plant. Land could be prepared, however, so that sewage does not come in contact with any food that is to be eaten raw, and it is quite conceivable that, with sewage irrigation as a general practice, crops of this kind may in future be grown under strict supervision.

One has but to consider the usual circumstances under which food is supplied to cities to understand how disease can be transmitted from sources other than sewage farms. In the United States consumers of milk and meat are, in most cases, very carefully guarded against danger from disease transmission. Berries and vegeta-

bles of all kinds, however, are gathered under conditions over which the consumer has very little control. The workers who handle them may be unclean or may be contracting or recovering from contagious diseases. Evidently it is desirable to cleanse carefully food of any kind that is to be eaten raw. One advantage enjoyed by sewage farms, especially large ones, is that they are under official supervision and are open to public inspection. In Europe municipally operated sewage farms have the advantage that sanitation is the first consideration; whereas, in the case of an individual or firm agreeing to dispose of the sewage of the city in return for what can be realized from the farm, profit is apt to be the predominant motive. Renting municipally owned land to farmers, with the distribution of sewage in the hands of watermen employed by the city, seems to work in Germany and Paris.

Possibilities of Sewage Irrigation of Crops in U. S.

Since sewage farming requires that only a moderate amount of sewage shall be applied to land, it follows that this time-tested method of disposal, when properly carried out, will satisfactorily filter the sewage. Surface soil is a natural purifier of water and is a decomposer of animal voidings. If soil of sufficiently sandy nature is available for sewage farming it would seem that irrigation of crops with the effluent from a settling tank is a method of disposal well worth consideration in the United States.

If sewage irrigation of crops is to be adopted by any municipality as the means of disposing of its settled sewage, it is important, if not indeed necessary, to secure adequate agricultural as well as sanitary engineering advice and assistance. The state agricultural experiment stations are becoming more and more the leaders of all farming enterprises within their respective states. They are supported from public funds and should be consulted by municipal officials who wish to consider the utilization of sewage on farm lands.

Many public institutions can utilize their sewage on the institution farm. This has been done for many years with satisfactory results by several institutions in New Jersey.

Comparison of the cost of sewage disposal by different methods in the United States and in foreign countries is difficult because of the lack of standardized methods of cost accounting.

In considering the economic bearing of sewage disposal, the fundamental fact is that rarely, if ever, is there a year when all the peoples of the world have enough agricultural products, although from the farmer's standpoint the amount of such products or the cost of distributing may be too great for profit. A glut on the American market may occur coincidently with a famine in China. With the whole world rapidly becoming more closely united and interdependent, this state of affairs can hardly continue indefinitely, and all important methods of conservation should receive consideration. The utilization of the fertilizer and water of sewage for crop production is one means of conservation.

When considering investment in land for sewage treatment as compared with expensive artificial sewage-purification equipment, the permanent value of the land should be taken into account, whereas the costly equipment for other methods may have to be scrapped, or expensive alterations in it made because of advancing scientific knowledge.

Fire-Retardant Surface Treatment for Wood Scaffolding

SEVERAL serious fires in the scaffolding of buildings and bridges during construction have resulted in large property loss and delay in completion. Frequent inquiries sent to the U. S. Bureau of Standards relative to methods that can be employed to decrease this fire hazard caused tests to be undertaken employing several types of treatment for wood scaffolding. The following information is reported by the bureau.

Impregnation or coating with many of the chemicals generally used to produce a fire-retardant condition are objectionable on account of irritating effects on hands of workmen. Also, no opaque coating should be applied to the surface of the timber which will obscure defects that have a bearing on strength.

Preliminary tests with various chemicals applied to the surface of the wood indicated that the penetration into the wood was insufficient to obtain any appreciable fire-retardant effect. Of acceptable surface coatings, sodium silicate (water glass) appeared promising, and further ignition and spread of flame tests were conducted with this treatment, utilizing one brush coat of sodium silicate of specific gravity 1.38, thinned with water to specific gravity 1.33.

The ignition tests were conducted by applying safety match flames, 1-in. yellow bunsen burner flames, and 8-in. blue bunsen burner flames for periods of one minute to the corner, edge or flat side of the specimen. Burning continuing for one minute or more after removal of the igniting flame was considered as ignition. Ignitions using safety matches were obtained in 63 per cent of the trials with the untreated specimens and in 14 per cent of the trials with the treated specimens, the results being averaged for the three species of wood. Specimens exposed to the weather for about three weeks and subjected in this time to three rains were ignited in 39 per cent of the trials. With the 1-in. bunsen flame ignition obtained in 78 per cent of the trials with the untreated specimens and in 3 per cent when coated with sodium silicate. The 8-in. bunsen flame gave 97 per cent ignition with untreated specimens and 12 per cent when treated.

In the spread of flame tests the flame-spread over a 12-in. marked length of untreated specimen was 8 in. and only 0.7-in. for the treated pieces. The effectiveness of the treatment was somewhat greater for Western pine and Douglas fir than for short-leaf or loblolly pine, possibly because of greater penetration.

An additional coat would undoubtedly have increased the fire-retardant effects considerably. Fine sand was applied on the coating of some of the specimens before it dried. The amount was not sufficient to affect appreciably the fire-retardant effect of the treatment, but it increased the roughness of the surface to an extent that more than counteracted any slipperiness produced by the sodium silicate.

It should be noted that the test conditions duplicate only those incident to the initial start and spread of the fire, and while a treatment that prevents ignition and retards the spread of fire from small sources is of value, it should not be understood as giving protection after the fire has attained any considerable volume. At the high temperatures incident to the latter conditions surface coatings are readily destroyed or their effects otherwise nullified, and they cannot retard appreciably the further spread of the fire.

Concrete Bulkheads for Creek Channel Improve Jacksonville Swamp Area

Attractive Waterway Built of Precast Sidewall, Floor Strut and Balustrade Units Changes Unsightly Hogans Creek Swamp Into Park—Porous Channel Bottom Permits Underground Drainage

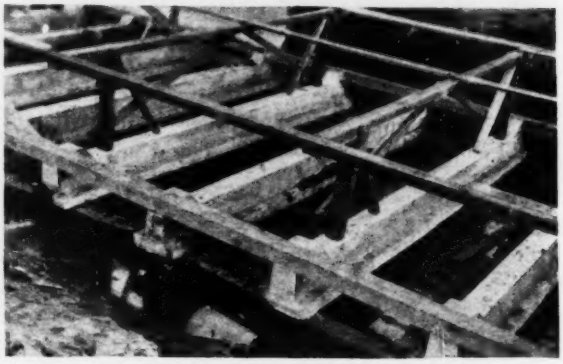
LONG an eyesore and a menace to the public health of Jacksonville, Fla., the sluggish, meandering Hogans Creek has been confined to a definite channel and the surrounding swamp area drained and filled in under a $500,000 improvement program recently completed. The creek is confined by an open-box waterway of precast sidewall units and concrete struts over a plank flooring to form a porous floor system, all resting on wooden foundation piles.

Improvement of the Hogans Creek area had been agitated for years, but it was not until 1925 that a municipal bond issue of $500,000 was authorized for the work. Various delays were encountered, but early in 1928 definite plans were prepared, and actual construction was begun in June, 1929.

Hogans Creek flows southeasterly through the northeastern section of the city and empties into the St. Johns River. Skirting the present principal business section on the north, it drains about 2,500 acres, a large part of which is known as the Springfield district. The municipality owns much park property along the sluggish stream to the east and north, and while a great deal of this had been improved to some extent, the debris-filled swamp, through which the meandering creek found its way, very effectively prevented the proper utilization of much of the bordering property.

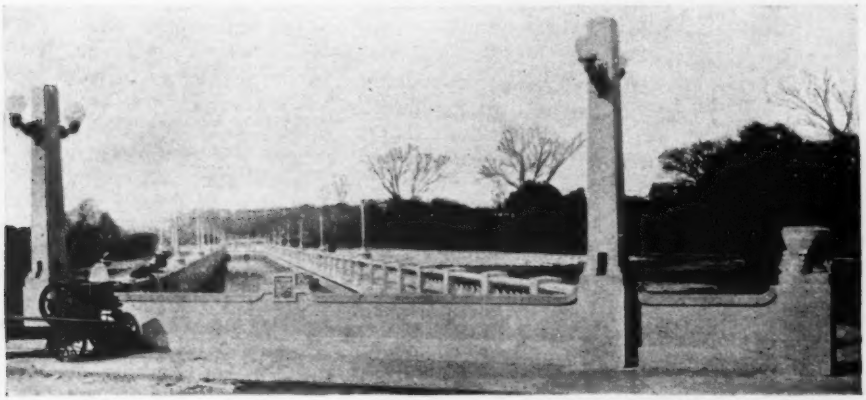
The project begins near Eighth St., just west of Boulevard St., and extends 11,000 ft. southeasterly to the river. In the first 7,800 ft., ending at Washington St. near its intersection with Beaver St., are found the major improvements. These consist of the dredging and shore line bulkheading of three lakes, the dredging and bulkheading of 6,300 ft. of channel, and the construction of ten vehicular bridges at street intersections, three footbridges, sidewalks, a tide lock at Washington St., and all

Foundation Piles for Concrete Bulkheads

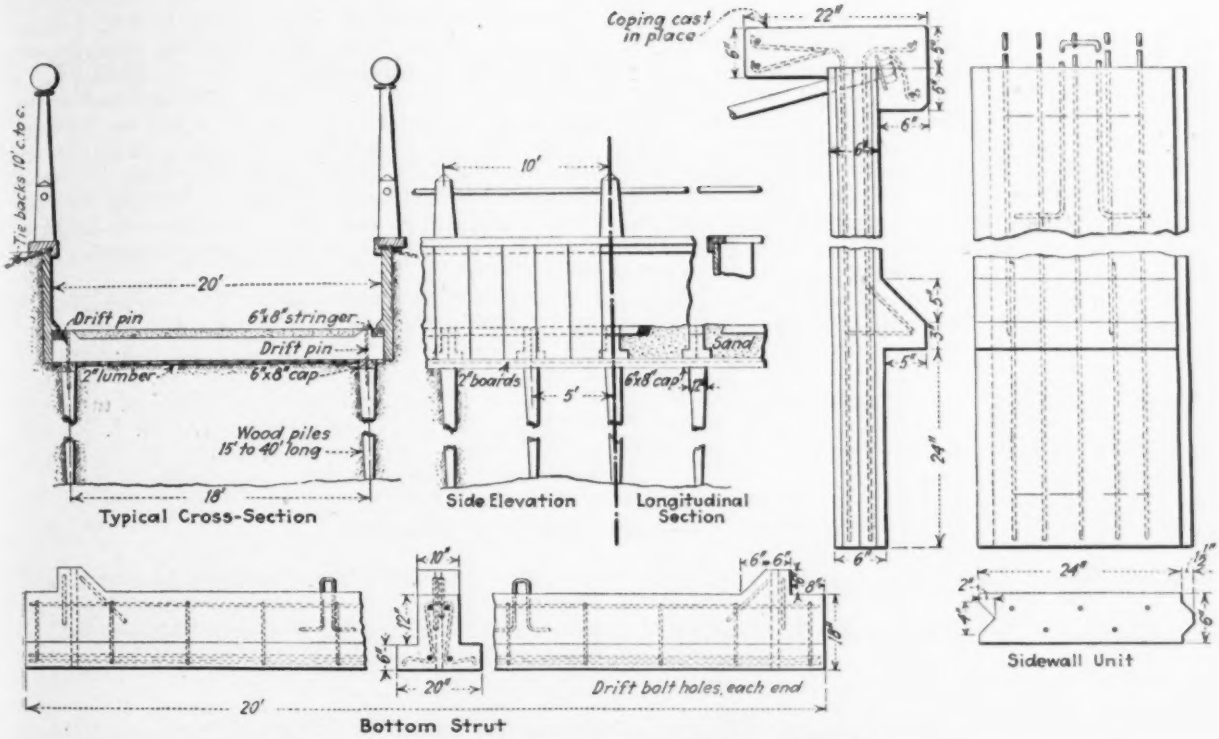


Bottom Struts in Place

Note planking underneath struts to form porous bottom so channel will act as drain. Bottom of channel will be filled with sand to top of struts.



Completed Section of Hogans Creek Improvement, Jacksonville, Fla.



Details of Hogans Creek Channel Concrete Bulkhead

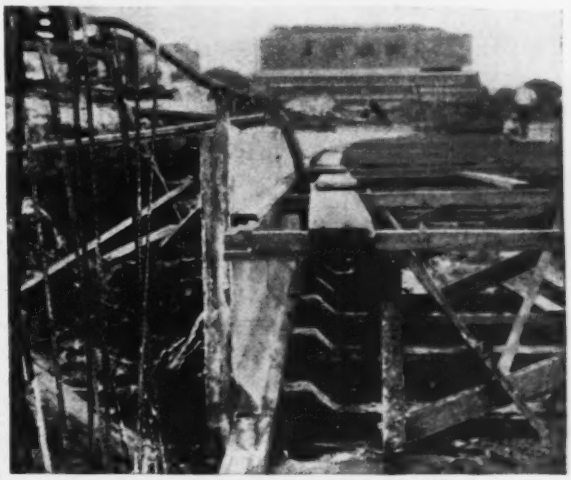
incidental backfilling and grading. East of Washington St. the present channel is being deepened by dredging for 3,200 ft. The creek level for the first 2,700 ft., which includes the three lakes, will be at El. 2.4 (mean low tide El. 0.0). At the end of this section the water drops over a spillway to El. 0.6, and this level is maintained on the remaining part of the work. On both sides for much of the entire distance the groundlevel rises 8 to 10 ft. a few hundred feet away from the creek.

A relatively soft but satisfactory bedrock is found at depths varying from 20 to 45 ft. below the flow line of the creek. Sand, from a few inches to 5 ft. in depth, overlies the bedrock, and above this to the ground line is a saturated, oozy muck, full of roots, logs and miscellaneous debris. These conditions, with the control of a possible high tide of 4 or 5 ft. above the normal rise of 1 ft., presented problems to be solved in the design and construction of the channelway.

Control of tidewater is effected by tide gates at Washington St., through which the flow of the stream is unhindered under normal conditions. Whenever the tide rises the gates are closed automatically and automatic pumps take care of the streamflow. Two pumps are provided, each with a capacity of 10,000 g.p.m. driven by a 50-hp. electric motor.

The situation required an open channel construction that would be stable, would take care of underground drainage and would fit into the esthetic scheme of the whole development. Use of continuous sheetpiling to support the sides was considered, but this plan was discarded because of high cost and the difficulties that would be encountered in attempting to drive the sheeting to correct alignment through the roots and debris. Furthermore, sheetpiling would cut off the groundwater and prevent the channel acting as a drain.

The design of the channel structure finally adopted



Channel Bulkhead Under Construction

The wall units are tied back to concrete anchors by 1¼-in. wrought-iron rods, as shown in the upper picture.

provides for a box 20 ft. wide on two rows of wood piling, 18 ft. apart, with the piles driven on 5-ft. centers. A 6x8-in. cap runs longitudinally over the top of each row of piles. Precast concrete T-beam struts span the two rows of piling on 5-ft. centers. Each end of the struts carries a 6x8-in. longitudinal wooden stringer, and upon these stringers rest the precast slab units that form the sides of the box. Two-in. planking is then placed longitudinally under the struts and the bottom of the box is filled with sand to the depth of 2 in. above the top of the strut, which provides a porous floor system for the admission of groundwater to the channel.

The original design did not call for a timber cap to be placed on the pile, but for the concrete struts to rest directly on the top of the piles. However, it was found impossible to maintain the pile alignment and spacing sufficiently accurately to permit of the exact placing of the T-beams; therefore the piles were given a 6-in. lower cutoff and the cap was used.

Bulkhead panel lengths vary from 6½ to 9 ft., and are precast in 2-, 4- and 6-ft. widths. The 6-ft. width is used generally, except on curves.

Casting Concrete Units—Gang molds are used in the casting yard where the bulkhead panels and the T-beams are precast. The yard permits the casting of 150 lin. ft. of bulkhead and 21 T-beams at the same time. A central mixing plant provides all concrete for the job, for both precast and cast-in-place work. A minimum 3,000-lb. concrete is specified and obtained under laboratory control.

Personnel—The concrete for the work was awarded on June 6, 1929, to the R. C. Lassiter Co., of Raleigh, N. C., and Jacksonville, for $399,553, with the time limit for completion fixed at 150 working days. W. E. Sheddan, city engineer of Jacksonville, was in charge of the work. C. D. Imeson, consulting engineer, and H. J. Klutho, architect, both of Jacksonville, were retained by the city to prepare a development plan and report.

Recent Hydraulic Dredge Operations Establish New Output Records

RECORDS of hydraulic dredge output have in the last five years reached new magnitudes. A million yards a month is no longer an astonishing figure of occasional performance by 30-in. dredges working in materials of the classes most favorable for pumping and with moderate lifts and discharge-pipe lengths. Without claim to an exhaustive survey, recent inquiry has disclosed the following high records of dredge output.

Working on the channel from Aransas Pass to Corpus Christi, the U. S. engineer department dredge "Gulfport," a 24-in. dredge having about 900 i.h.p., removed 1,550,202 cu.yd. of maintenance dredging during the month of August, 1929. The material was classified as 100 per cent silt. The average length of pipe line was 996 ft., and the lift was about 4 ft. The depth of cut was about 8 ft. The cubic yards per pumping hour were almost 2,600.

The "Currituck," which had been changed to a 30-in. dredge during April, 1929, in an open-water cut, while dredging in the inland waterway of the Pamlico-Neuse River section, excavated 1,130,033 cu.yd., or at the rate of 2,500 cu.yd. per pumping hour. The average length of pipe line was 965 ft. and the lift 4 ft. The material was classified as 75 per cent fine and 25 per cent mud and was free from roots and stumps. The advance was 52.5 ft. per pumping hour.

The maximum previously dredged in one month while the "Currituck" was a 20-in. dredge, was in September, 1922, when it was again working in open water and the gross output was 651,766 cu.yd., or at the rate of 1,436 cu.yd. per hour. The average length of pipe line was 750 ft., and the lift was 4 ft. The material was 50 per cent sand and 50 per cent mud and was free from roots.

The record performances of the four 30-in. dredges of the port of Portland, Ore., working in the West Swan Island cut in the Willamette River and in the Columbia River at Longview, Wash., are given in the accompanying table by James H. Polhemus, general manager. The material excavated was sand.

A sample of the sand from the Swan Island cut has the following mechanical analysis: 97½ per cent passed a 20-mesh screen, 95.5 per cent passed a 30-mesh screen, 78 per cent passed a 50-mesh screen, and 8.75 per cent passed a 100-mesh screen. The weight of this material per cubic foot dry was 89.85 lb., the specific gravity was 2.50, the percentage of voids 42 per cent.

The mechanical analysis of the Columbia River sand mentioned in one of the dredge records was as follows: 29.35 per cent passed a 10-mesh screen, 15 per cent passed a 20-mesh screen, 10 per cent passed a 30-mesh screen, 4 per cent passed a 50-mesh screen, and 1 per cent passed a 100-mesh screen. The weight of this material dry was 91.72 lb., the specific gravity was 2.66, and the percentage of voids was 77 per cent.

OUTPUT RECORDS OF PORT OF PORTLAND HYDRAULIC DREDGES

	Total Cu.Yd. in 24 Hours	Pumping Hours	Cu.Yd. per Pumping Hour	Length of Pipe Line, Ft.	Net Terminal Lift, Ft.	Pipe Line Velocity, Ft. Per Sec.	Per Cent of Solids
30-in. dredge "Clackamas," August 6, 1926							
West Swan Island..	52,500	21:45	2,414	1,730	31.5	17.4	21.2
30-in. dredge "Columbia," April 13, 1925							
West Swan Island..	47,250	21:10	2,232	3,640	23.5	18.8	18.1
30-in. dredge "Willamette," May 9, 1924							
Longview.....	46,960	18:00	2,609	1,750	26.0	15.1	26.4
30-in. dredge "Tualatin," April 26, 1922							
West Swan Island..	46,555	19:25	2,398	2,215	25.0	19.0	19.3

The maximum monthly outputs of these dredges under like conditions vary from 700,000 to 1,000,000 cu.yd. per month. The 30-in. dredge "Clackamas," working 26 days in August, 1926, delivered 1,270,250 cu.yd. of measured sand into the fill through a pipe line averaging nearly 1,800 ft., with a net terminal lift of about 32 ft. The next best record is that of the dredge "Tualatin," which in April, 1922, delivered 764,545 cu.yd. of measured sand into the fill through a 2,200-ft. pipe line against a net terminal lift of 25 ft. These dredges have such large capacities, are shifted from one job to another so often and are working under such varied conditions, that a maximum output per month is rather difficult to state.

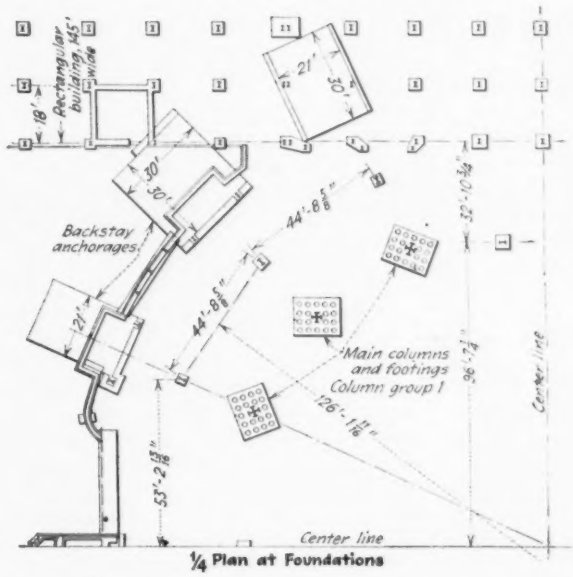
Figures for the operation of the 30-in. hydraulic dredge "R. O. Sweezey" in the power canal at Beauharnois, Que., were given in *Engineering News-Record*, Dec. 11, 1930, p. 920. The maximum output of that dredge to date, working in stiff marine clay, is 817,000 cu.yd. It works against an average lift of 14 ft. and a discharge line reaching a maximum length of 6,000 ft.

Cable System to Support 200-Ft. Circular Roof

Novel Suspension Plan Will Be Employed in Chicago World's Fair Building—Roof Load to Be Carried by Suspension Network to Backstayed Towers Around Perimeter of Structure

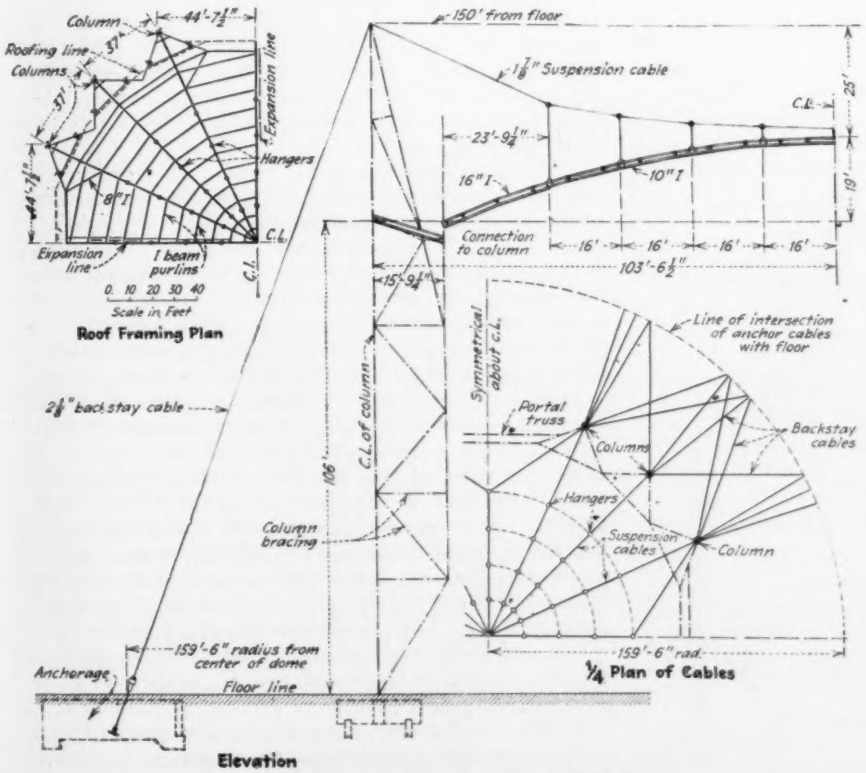
A SUSPENDED DOME, 200 ft. in diameter and hung from cables attached to towers arranged in a circle is a novel feature which will form a conspicuous part of the Travel and Transport Building, now under construction for the Chicago World's Fair or "Century of Progress" exhibition of 1933. The dome will cover a circular structure with an inside clear height of 125 ft., which is designed to house an exhibit of locomotives placed on tracks radiating from a turntable, as in a railway roundhouse. This structure, the general design of which is shown in Fig. 1, is an annex of the main building, which is 1,000x145 ft. in size and two stories high. Its suspended dome roof is believed to be the first application of such a design, although large suspended rectangular roofs have been built, as in the case of the airship hangars and repair sheds in France, described in *Engineering News-Record* of Oct. 27, 1921, p. 688.

Purpose of Design—Among controlling reasons for the adoption of the suspended dome were: (1) the elimination of heavy steel arch-rib construction, with its high cost of centering for erection; and (2) the possibility of carrying vertical supports and wall surfaces as high as the springing line of the dome, thus effecting considerable economy in carrying the roof load, both by direct tension in the cables and direct compression in the vertical columns. The entire roof is to be erected by means of platforms and boatswain chairs hung from the cables. Another determining factor in the adoption of this design was the interesting appearance of the tall braced columns and their cables.



¼ Plan at Foundations

Fig. 2—Quarter Plan of Columns and Anchorages
Showing intersection with main building.



¼ Plan of Cables

Fig. 1—Exhibition Building With Suspended Dome

The circular structure, having a clear interior diameter of 200 ft., is formed within a ring of twelve steel towers or braced columns 150 ft. high, having their rocker bearings and their tops in a circle of 212-ft. diameter (see Fig. 2). At the tops are attachments for the suspension cables and for the anchor of backstay cables. Around the base will be a structure 25 ft. high and approximately 300 ft. in diameter, inclosing the backstay cables at their connections to the anchorages. This arrangement is expected to complete the roundhouse effect of the interior. The inclosure or

wall construction, which is similar to that of the rectangular part of the building, consists of vertical channels of light cold-rolled steel, having their flanges inward and clipped to horizontal girts. The backs of the channels form the exterior surface of the wall, while a lining of fireproof board attached to the flanges will convert the channels into a series of ventilating flues to prevent excessive heat in summer weather.

Towers and Cables—The twelve supporting towers are arranged in three groups or quadrants, with portal trusses connecting the groups. Each tower, Fig. 4, has a main column having the section of a cross, formed by one large I-beam and two smaller beams with their flanges riveted against its web. This column is trussed on its inner side to give the required stiffness. Between the three columns of each group are I-beam struts, while on the outer face are girts extending across the three, forming triangular walls of the group and providing for the attachment of the wall sheathing. At the heads of the columns are wing gusset plates for the attachment of the suspension cables of the dome and the backstay cables.

The dome framing consists of radial 16-in. I-beams curved vertically to a rise of 19 ft. and connected by I-beam purlins riveted between the webs of the radial beams or rafters. Upon this framing will be a deck of light cold-rolled steel channels with flanges inward, similar to the typical roof and floor construction of the main building. The height from floor to crown of dome will be 125 ft.

From the towers a series of $1\frac{7}{8}$-in. suspension cables span the inclosed circular space with a sag or deflection of 25 ft. At four points on either side of the center are hanger rods which are attached to the dome framing. In addition to the radial cables attached directly to the towers, there are two shorter cables on the center lines between the quadrants or column groups, having each end carried to a pair of towers by diagonal cables. This arrangement is made necessary by the four curtain walls and portals between the groups of towers.

The suspension cables have a versine or deflection of approximately one-ninth the span. In the backstays the average angle is 70 deg. from the horizontal. This steep inclination necessitates more and heavier cables than

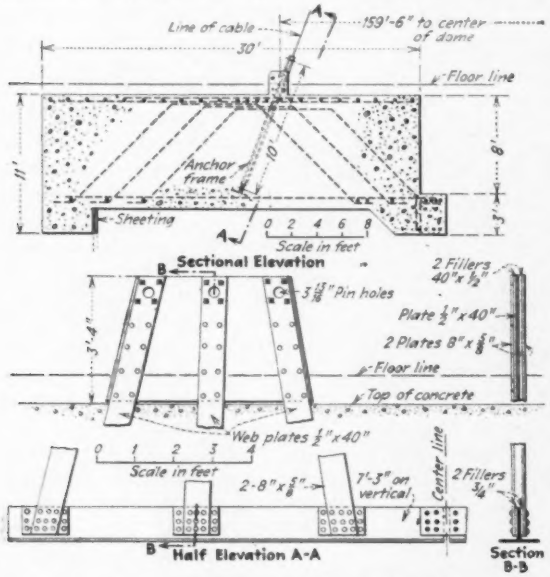


Fig. 3—Anchorage for Backstay Cables

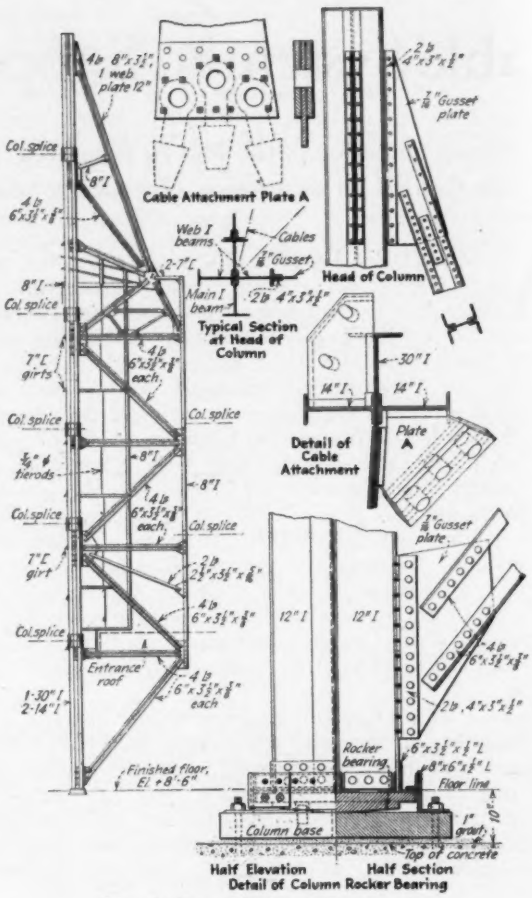


Fig. 4—Braced Column Construction

those of the suspension system. Therefore, each quadrant has fourteen backstays of $2\frac{1}{8}$-in. cable. All cables are attached to the towers by open bridge sockets. The hanger rods are fitted with turnbuckles for adjustment of length.

Each anchorage, Fig. 3, is a reinforced-concrete block approximately 30x21 ft., and 9 to 11 ft. thick, having embedded in it a steel anchor frame at the same slope as that of the cables. In the tops of the frame members are holes for pin connection to the open sockets and turnbuckles for the cable attachments. Footings for the towers are of reinforced-concrete 14½x12 ft. and 5 ft. thick, each capping a cluster of twenty wood piles of 35-ft. average length, driven to refusal in the sand fill.

Load Effects—The dome design is based on a dead load of 15 lb. per sq. ft. and a snow or live load of 25 lb., together with a horizontal wind pressure of 25 lb. A characteristic of this structure is its flexibility. The ratio of live load to dead load and the steepness of the backstay cables are such as to cause the elongations in the ropes to allow the tops of the columns to move toward the center. To meet these conditions, the three columns in each quadrant, with their backstay cables, are designed to act as a unit. The columns are braced together in horizontal planes and in a somewhat unusual arrangement of vertical planes, as made necessary by architectural requirements. Adjacent column groups are connected to each other at the roof elevations by horizontal trusses, the end connections of which are so detailed as to slide at the end columns and thus allow free movement for

the latter, but the bolts are made sufficiently strong to transmit forces from one column group to the other.

As the top of a column group may deflect radially as much as 8 in. under live-load changes, the base of each tower was given a rocker bearing. Furthermore, as the live-load changes will cause a downward deflection of the dome roof of almost 3 ft. at the crown, four radial expansion joints have been provided in the roof to allow it to conform to this deflection. Suitable slots are also provided at the connection of the rafters to the towers to allow for the vertical movement of the roof and for horizontal deflections of the towers. To assure harmonious action with the other parts of the structure and to simplify the structural details, especially the vertical expansion joints, the portal walls are suspended from the trusses connecting the four column groups.

Designers—This very exceptional building was designed under the direction of a board of architects composed of E. H. Bennet, H. Burnham and J. A. Hotabird. The working drawings were prepared by the department of works of the exhibition. Daniel H. Burnham is director of works; C. W. Farrier is his assistant; B. M. Thorud, structural engineer; L. Skidmore, chief of design; and N. A. Owings, development supervisor. For the design of the suspended dome with its suspension cables and supports, Leon S. Moisseiff is consulting engineer. The general contractor is the John Griffith & Son Co.

Independent Frames Support Exterior and Interior Surfaces of Temple Dome

Nine Groups of Columns With Ring Girders Carry Double Framing of Dome Having Concrete and Glass Shells

EXCEPTIONAL features of architectural and structural design are represented in the Baha'i temple which is to be built at Wilmette, Ill. This structure, the architect's design of which was shown in *Engineering News-Record* of Aug. 14, 1930, p. 269, is to be a nine-sided polygon of steel and concrete framing, with a central circular hall about 72 ft. in diameter, surmounted by a dome and having a clear interior height of 138 ft. above the main floor. The general design is shown in Fig. 1.

Foundations—A concrete foundation, built some years ago, includes a basement 204 ft. 8 in. in diameter and 27 ft. high. There are nine concrete piers, 6 ft. in diameter, sunk to bedrock at 124 ft. depth. Each pier is flared out at the top to a rectangle 9 ft. 9 in. by 11 ft. to carry four continuous columns which support the dome and also portions of the galleries and first-floor framing. These four columns will rest upon a two-course I-beam grillage, transmitting a load of approximately 700 tons to each pier. Interior footings for the lighter column loads are carried by composite piles consisting of 35-ft. wood piles cut off at 20 ft. below grade and topped with 16-in. concrete piles which extend into the footings.

A meeting room in the center of the basement was one of the architectural requirements, and this was provided by the construction of an elliptical concrete dome 72 ft. in diameter, having a rise of 12 ft. 3 in. This dome, designed for 100-lb. live load, has a minimum thickness of 12 in. and is supported upon a circular concrete girder framing into the columns which rest upon the foundation piers.

Superstructure—The main design feature consists of a circular area or hall 72 ft. in diameter, 103 ft. high above the main floor and surmounted by a dome of 35-ft. radius, giving a total clear height of 138 ft. There will be no intermediate floors, but only galleries around the open space. The base portion, at the first floor, is to be 36 ft. high and 150 ft. in diameter, divided into nine alcove units with a main entrance between each pair of units. This base will be surmounted by the first gallery portion, 47 ft. high and approximately 136 ft. in diameter. Above this will be the second gallery portion, 20 ft. high and 93 ft. in diameter. At 103 ft. above the first floor will be a third gallery forming the base of the dome and serving for the inspection of heating and lighting equipment.

Exterior walls and ornamentation will consist almost entirely of concrete tracery backed by glass. This inclosing tracery, made by a process giving a specially smooth surface, will extend from the first floor to the top of the dome. Under the exterior shell of the dome will be a waterproof shell of wire-glass, below which will be an ornamental perforated interior shell. Lighting features for novel illuminating effects will be arranged between

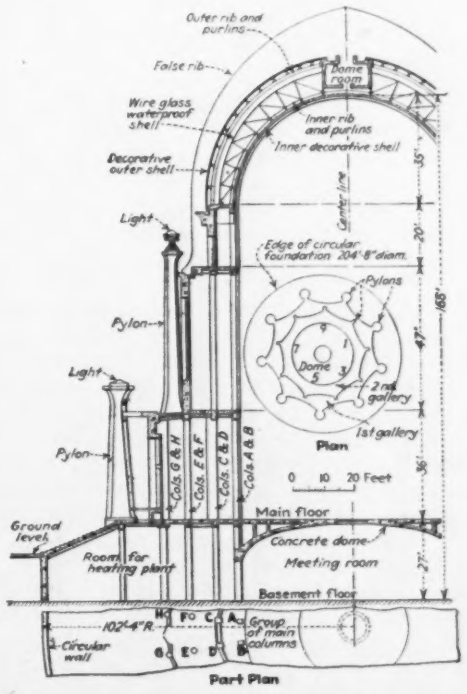


Fig. 1—Typical Section of Temple and Dome

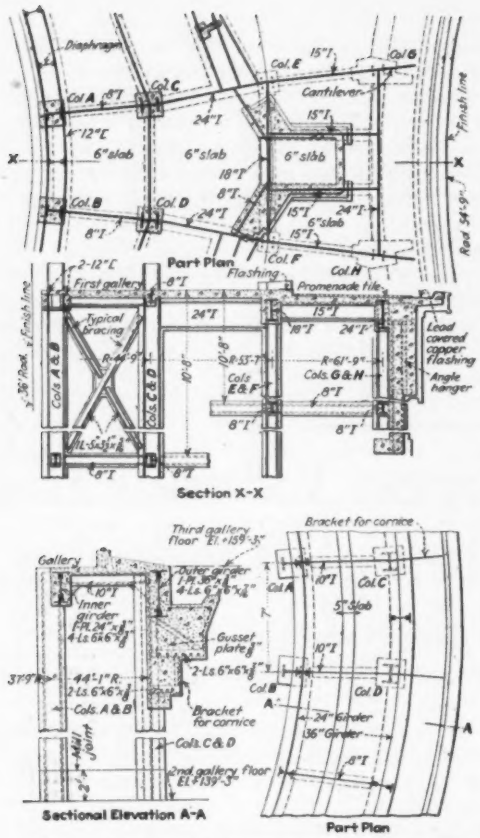


Fig. 2—Details of Gallery Framing, Baha'i Temple

the glass shell and the inner decorative face of the dome.

In the steel superstructure each of the nine corners will consist of a group of four 14-in. H-columns, with struts and diagonal bracing, which are continuous for the support of the galleries and the dome. These are marked, *A, B, C, D* in Fig. 1. In addition, there will be four steel H-columns (marked *E, F, G, H*) and additional concrete columns for the support of the roofs over the side portions of the first floor.

At the first and second gallery levels circular girders of steel channels will be framed on the inner and outer faces of the interior columns on a radius of 37 ft. 9 in. from the center of the building. These circular girders, shown in Fig. 2, are designed on the basis of full continuity, reinforced by plate and angle separators riveted between the inner and outer girders. The gallery floor framing will be tied together by a reinforced-concrete slab of 6-in. minimum thickness. Special framing in these two gallery floors will support the corner pylons and the false ribs over the dome.

At the third gallery (Fig. 2) two circular plate girders will support the exterior and interior dome framing. These girders will be framed to the faces of the columns that are continuous to the foundation piers and will be tied together by a framing of I-beams and gusset plates covered by a concrete slab of 5-in. minimum thickness to take care of torsional stresses. The exterior ring girder will be 36 in. deep with a radius of 44 ft. 8½ in.; the inner girder, 24 in. deep, will have a radius of 38 ft.

Dome Design—Of particular interest is the structural design of the dome, which will consist of inner and outer concentric framing, each having ribs of I-section composed of two angles for each chord and lacing bars for web members. This design is shown in Fig. 3. The vertical radius on the bottom chord is 44 ft. 8½ in. for the

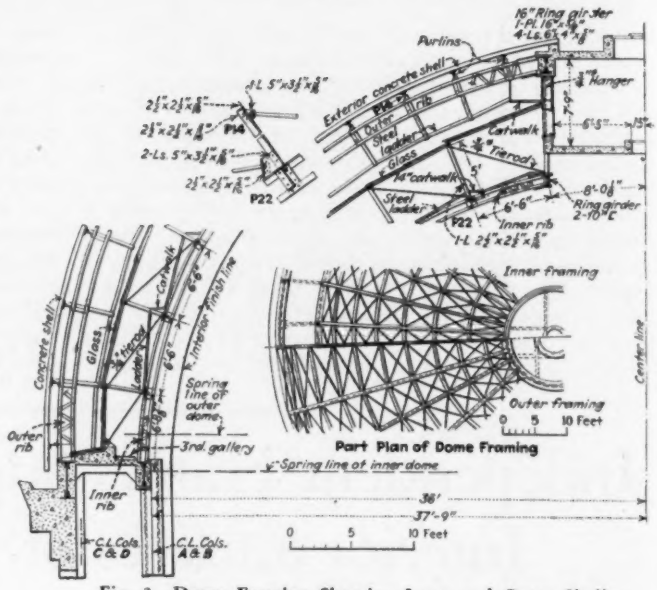


Fig. 3—Dome Framing Showing Inner and Outer Shells

outer framing and 38 ft. 4¼ in. for the inner framing. These two systems of dome framing are independent and are not to be connected in any way, so that unequal expansion and contraction will not affect the structure. The outer ribs frame against a 16-in. ring girder around a 16-ft. central opening at the crown. The inner ribs frame against a similar ring girder composed of a pair of 10-in. channels placed back to back. A concrete slab at each of these ring girders forms a solid floor at the crown.

From alternate outer ribs will hang ladders terminating in a catwalk for inspection and maintenance purposes. On the inner framing will be a similar system of catwalks and ladders. The ornamental interior dome will be hung from the inner ribs. Above these ribs will rise a series of angle struts to support the framing for the glass watershed; this framing will be of special aluminum sections to take care of condensation and dripping. Upon the outer and inner steel ribs will be circular lines of purlins with diagonal bracing, forming a complete framework for supporting and suspending the two ornamental shells.

In determining the rib and ring stresses, various methods were studied, and the method outlined by E. Schmitt in a paper on "Spherical and Framed Domes" (*Transactions,* American Society of Civil Engineers, Vol. 52, 1904), with minor modifications, was found to be the most suitable. In obtaining the diagonal stresses the problem was more intricate than that of the ribs and rings. Several methods were considered, and that given by Hütte was adopted. Snow and wind loads had to be considered on both the systems of framing, as the concrete tracery of the exterior shell would not completely retard their action on the inner dome.

Designers—For this building, the architect was the late Louis Bourgeois, Wilmette, Ill. Benjamin B. Shapiro, Chicago, is structural engineer; the Research Service, Inc., Washington, D. C., acts as managing and supervising engineer. The George Fuller Co., New York, has the contract for the building complete. The foundations, already built, were designed by Mr. Shapiro under the supervision of the late H. J. Burt, consulting engineer, and were described in *Engineering News-Record,* Nov. 22, 1923, p. 842.

Rigid Inspection Produces Better Pavements

Core Tests Made on Detroit Streets Before Pavements Are Accepted—Close Control on Concrete by City Engineer's Office

MARKED IMPROVEMENT has been obtained in the quality of street paving laid under contract for the city of Detroit during the six and a half years that the construction has been given engineering supervision by the city engineer's office. Elimination of the softer limestones as coarse aggregate and close attention to the methods of mixing and placing the concrete have resulted in increasing the strength of the pavement by about 25 per cent, as determined by cores drilled at the age of 28 days.

Prior to 1923 the city engineer's office had little to say about the way the pavements were constructed but was limited in its action to the preliminary surveys and preparation of the design. Compression tests made in that year, however, on cores drilled from pavements laid in 1921 and 1922 showed unsatisfactory strength. The average strength obtained from the tests on 43 cores was 1,492 lb. per sq. in., with only four tests yielding a value greater than 2,000 lb. In an attempt to effect some improvement in these conditions, the concrete mix was changed from 1:3:6 to 1:2:4, and inspection of pavements construction was put under the supervision of the city engineer.

Studies made during 1923 revealed the fact that a soft limestone with a high dust content was being used for coarse aggregate on a large number of the contracts. The batches were poorly proportioned, and most of the bins were equipped with a measuring hopper for the sand but none for the coarse aggregate. The mixing time, in most cases, was found to be anywhere from 15 to 30 sec., and as all the mixers were equipped with chutes for placing, an excess of water was necessary to allow the concrete to flow easily. The 1924 specifications contained provisions for remedying these conditions.

All mixers were required to be equipped with boom-and-bucket delivery, automatic timing devices that locked the discharge lever during the full mixing time, and visible water gages. In order to prevent the use of the softer grades of limestone, a minimum hardness and roughness and a maximum allowable percentage of wear were specified. The maximum slump was set at 3 in., and the concrete mix was changed to 1:2½:4. At the same time an engineer and an assistant were assigned to the sampling of material, preparing test cylinders, making slump tests and checking the measuring hoppers and timers. Arrangements were made whereby the materials and cylinders could be tested in the laboratory of the department of buildings and safety engineering. Two more assistants have since been assigned to this work.

Crushing tests made during 1924, the first year that the new specifications and close engineering supervision were in effect, showed that the concrete was developing a strength of 2,592 lb. per sq. in. under the test conditions, which was an increase over the 1923 tests, in spite of the leaner mix. In subsequent years the quality of the concrete has consistently improved, as shown by Table I

Cores were drilled from completed pavements starting with the 1924 construction season. Pavements tested during this year had been laid during the previous summer, and the concrete was approximately six months old. The cores averaged 3,283 lb. per sq. in. During the winter following the 1925 paving season cores were taken from the streets paved during the previous summer and a second set of cores drilled from the 1924 pavements. In 1926 two additional drills were purchased, and since that time the drilling has been done under the direction of inspectors employed by private testing laboratories. It was believed that the employment of a disinterested party to do the testing would eliminate criticism of the tests by the contractor. Since 1927 the specifications have provided for the coring of all pavements before their acceptance. A continued improvement has been noticed in the strength of the cores and in the thickness of both asphalt and concrete. The 28-day cores from the 1927, 1928 and 1929 pavements have averaged over 3,200 lb., or approximately the same as the 1924 six-month cores.

Adoption of a richer mix and an increase in paving thickness to 3½ in. of asphalt on an 8-in. base caused an increase in the cost of the pavements laid in 1923. Including the cost of grading, curb, concrete base, asphalt top, inspection and cost of advertising, the average cost was $4.45 per square yard in 1922, and rose to $5.99 in 1923. Since that year, however, the paving costs have gradually declined to a cost in 1928 of $3.20 per square yard.

The improvement in quality of Detroit pavements has been effected during a period of lowering prices and greatly increasing volume of work. In has been done at a very slight increase in the cost of inspection and testing, less than 2c. per square yard of pavement.

TABLE I—CRUSHING STRENGTH OF TEST CYLINDERS AND CORES DRILLED FROM COMPLETED PAVEMENTS

	28-Day Cylinders		28-Day Cores		6-Month Cores	
Year	No. Tests	Average Strength	No. Tests	Average Strength	No. Tests	Average Strength
1923	28	2,403	...	....	...	....
1924	62	2,592	...	....	82	3,283
1925	211	2,825	...	....	151	3,646
1926	401	2,994	...	....	639	3,889
1927	824	3,111	1,656	3,326	783	4,025
1928	611	3,024	1,310	3,293	701	3,697
1929	581	3,273	964	3,241	...	....

TABLE II—QUANTITIES AND UNIT COSTS OF DETROIT PAVEMENT, 1922-1928

Year	Square Yards Pavement Laid	Cost per Square Yard
1922	716,180	$4.45
1923	809,278	5.99
1924	1,387,155	4.83
1925	2,373,074	4.33
1926	2,928,414	3.95
1927	3,345,641	3.57
1928	1,909,508	3.20

Road Construction Shows World-Wide Progress

Progress in road construction throughout the world is indicated by the present mileage of 7,805,629, according to a survey made by Frank B. Curran and B. P. Root, of the Department of Commerce. The United States, not including Alaska and the outlying possessions, ranks first among the countries of the world with a total of 3,016,281 miles, or 38.7 per cent of the world total. Considering mileage in proportion to area, without regard to road surface, Japan leads all other countries of the world with 3 miles of road per square mile of area; the United States is in thirteenth position, with 1 mile for every square mile of area. The survey shows an increase of 1,223,628 miles throughout the world over last year's figures, or an increase of 18.6 per cent. The United States is first on the list in the matter of hard surface roads, having 167,155 miles.

FROM JOB AND OFFICE

Hints That Cut Cost and Time for the Contractor and Engineer

Cutting Off Piles Under Water

By S. Standish
Standish Engineering Corp., Chicago, Ill.

MARINE contractors are often faced with the necessity of pulling or cutting off wooden piling at the level of the bottom in order to clear a river or harbor for navigation purposes. In many instances the cost of pulling the piling is excessive, especially where there is considerable penetration. The underwater saw can be used, but this, while much more economical than pulling, requires a special rig. The old method for cutting off piling with dynamite was to encircle the pile with a heavy wire ring, attach several sticks of dynamite to this ring and then lower it to the bottom where it was exploded. The difficulty with this method lies in the fact that two or three shots are usually required, and often obstacles, such as spikes, bolts, or knots on the body of the pile, prevent the ring from slipping all the way down.

The writer has found through experience that the simplest way to cut off wooden piles with dynamite is to prepare a bomb consisting of three or five sticks of dynamite with which are grouped a corresponding number of round steel bars of about the same length. The bomb is held together with several turns of wire. If this bomb is lowered in the water so that it rests on the bottom within 3 ft. of the pile, the explosion will cut the pile off clean at the bottom, as the bars act somewhat in the nature of shrapnel.

Diagram Gives Flow of Water in Pipes

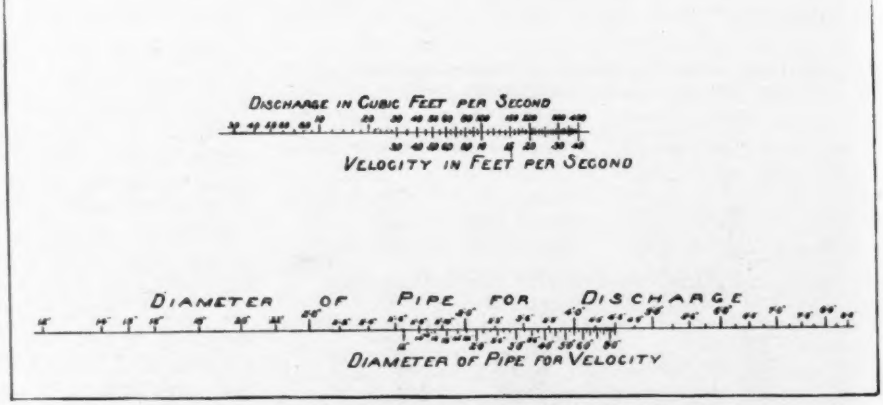
By H. L. Powell, Jr.
Pahala, Kau, Hawaii, T. H.

CHARTS for solving problems relating to the flow of water in pipes are not uncommon, but those which have come to the writer's attention are excessively complicated, tending to confusion and error. The nomograph given herewith, which can readily be constructed to the proper scale by the method outlined, is believed to be much simpler and easier to use. It is based upon the Chezy formula for the flow of water in open channels, in which the latter is a circular pipe flowing full. As the diagram holds true only for a constant assigned value of n in Kutter's formula, a set covering those values of n commonly met with is advisable for general office use. The scale can be varied according to the accuracy desired.

In constructing the nomograph the scale of slopes is made first. The slopes are values which are equally divisible by four, and are carried to two decimal places for the length of 100 ft. Indices on this scale are the logarithms of the square roots of the different slopes, but they are numbered as the value of the slopes. At a convenient distance a parallel scale is laid off on which values of the factor $ac\sqrt{r}$ are indicated logarithmically for each diameter of pipe. The notations of these points are not the numerical values of the factors but are the diameters of the pipes corresponding to each. A third parallel line is drawn equidistant between these two scales. Several quantities are then computed, and lines drawn from the corresponding slope and diameter scales to intersect the middle scale, determining the magnitude of this scale and the position of the unit values thereon. Indices are put on the upper side of the line indicating discharges in second-feet. Indices below the line are labeled as velocity in feet per second and are one-tenth of the value of those above the line. Then the values of the functions of $c\sqrt{r}$ are positioned on the lower side of the lower scale by drawing lines from the slope scale through the velocity indices to intersect the lower scale and computing several actual velocities. These are numbered with the numerical value of the diameter, not with that of the respective values of $c\sqrt{r}$.

All graduations of all scales are logarithmic. The upper scale divisions are the square roots of the slopes. The lower scale indicates the logarithmic values of $ac\sqrt{r}$ and $c\sqrt{r}$. The indices on the middle scale are logarithms of the actual numbers.

The use of the nomograph is very simple. Knowing the slope of a proposed pipe and the quantity of water to be cared for, place a straight-edge on the values of these two quantities and note where it intersects the lower scale. The figure on this scale to the right of the


Slope in Feet per Hundred
Discharge in Cubic Feet per Second
Velocity in Feet per Second
Diameter of Pipe for Discharge
Diameter of Pipe for Velocity

Nomograph for Determining Flow of Water in Pipes
Kutter's formula $n = 0.013$

straight-edge is the diameter of the pipe which is required. To determine the velocity of the water in the pipe, revolve the straight-edge around the slope point to the corresponding diameter on the scale "Diameter of the Pipe for Velocity" (the lower side of the lower scale) and read the magnitude of the point of intersection of the middle scale by the figures on the lower side. This is the velocity in feet per second.

California Method of Placing Asphaltic Road Surfacing

METHODS used in applying oil-application surfacing to well-consolidated rock roads subjected to moderate traffic were recently described by T. H. Dennis, state maintenance engineer of the California division of highways. The "armorcoat" wearing surface, as it is called in California, is about ¾ in. thick and is built up in three spreads of rock on three applications of heavy asphaltic oil (either emulsion or heated). It is applied only to well-consolidated surfaces which are properly shaped and comparatively smooth before the application. The limited thickness of the surfacing permits only minor roughness to be taken out of the base by the surfacing coat.

Specifications require 90 lb. of rock per square yard and, when using asphaltic emulsion, ¾ gal. per square yard, or 8,800 gal. per mile. Steps in applying the surface are: (1) Apply ⅛ gal. (quantities given are per square yard) of emulsified asphalt as a prime coat; (2) cover with 50 lb. of clean screenings (½- to ¾-in. size), then roll and sweep; (3) apply ¼ gal. emulsified asphalt; (4) cover with 20 lb. of screenings (⅜- to ½-in. size), roll and sweep; (5) apply ⅜ gal. emulsified asphalt; (6) cover with 20 lb. of screenings (⅛- to ¼-in. size), roll and sweep. The emulsified asphalt used in some of the latest practice is a commercial 55 per cent asphalt emulsion which has a very rapid break.

Each application of asphalt is covered uniformly with rock dropped from a spreading device on the tail gate of a truck operated in reverse, so that the wheels do not come into contact with the freshly spread material. Following some hand spotting and brooming, each spread of rock is rolled once, and then the power broom is used to eliminate rock not firmly embedded in the preceding course. The result is a smooth surface at a cost which ranges from $2,000 to $2,500 per mile, depending on location.

Machines Shape Crib Timbers for Pier Construction

SPECIAL wood-working machines have been devised to facilitate the framing of the timber cribs for an extension of the ferry pier of the state highway department at Mackinaw City, Mich., construction details and unit prices for which were given in *Engineering News-Record*, Sept. 25, 1930, p. 515. One machine cuts the gains or mortises, and the other cuts the ends of the timbers to a dovetailed shape to enter the mortises. Both are motor-driven, but the mortising machine, Fig. 1, has a V-belt connection from motor to cutter shaft, while the dovetailing machine, Fig. 2, has a direct drive and its cutter heads are mounted on double extension shafts. In both machines the cutter heads are mounted on traveling arms, which move forward and back through the timber, a cut being made in either direction. At the mortising machine the timber moves lengthwise, the cutter head swinging across it while the arm is moved in an arc, which allows the cut to be made at the correct angle to fit the dovetailed end of a cross-timber. At the dovetailing machine the timbers are on both sides and parallel with the cutter shaft, which swings across them, the ends of the timbers being butted against stops between the two sets of cutter heads.

The rough timbers, 12x12 in., are sized to exactly 11 15/16 in. so that they make a tight crib, while the mortises and dovetails are cut to a close fit, as may be seen by Fig. 3. The machines trim the timbers very rapidly and have greatly facilitated the framing for the cribs. Roller carriers convey the timbers to and from the machines, which were designed and built by the Leitelt Iron Works, Grand Rapids, Mich., in conjunction with the Lyons Construction Co., of the same city, which has the contract for the ferry pier extension.

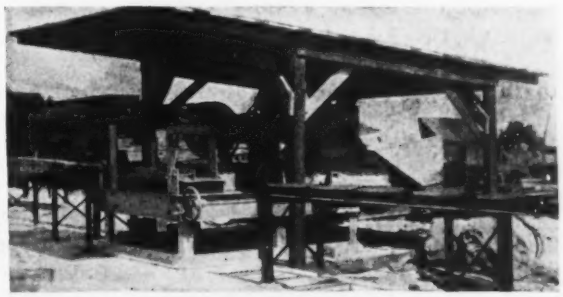


Fig. 1—Mortising Machine

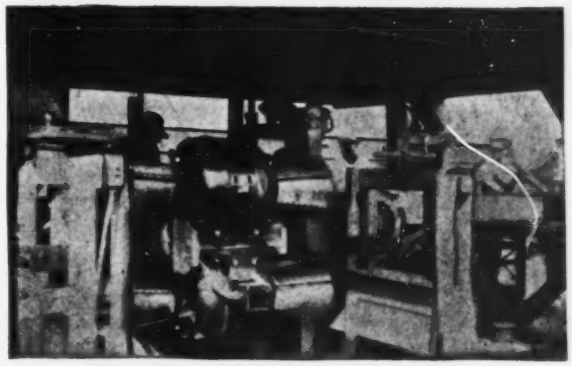


Fig. 2—Cutter Head of Dovetailing Machine

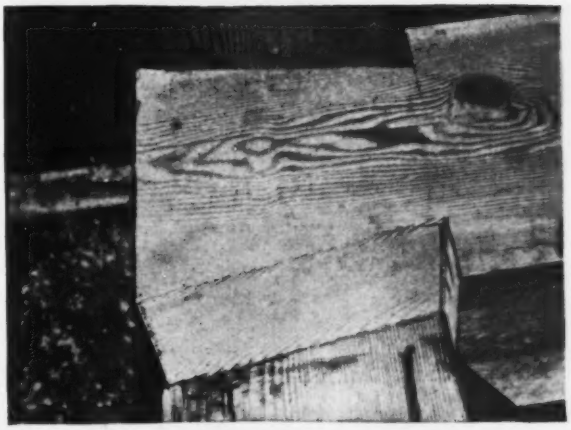


Fig. 3—Machine-Cut Mortise and Dovetail

Setting Slope Stakes

By A. N. George

Resident Engineer, California Division of Highways, South Pasadena, Calif.

IN SETTING slope stakes for the grading of the state highway from Pasadena to Mt. Wilson, Calif., differences in elevation between the center line of the highway and the stake location of 50 ft. were not uncommon, and ordinary methods of setting the stakes proved slow, laborious and subject to error. To meet this situation we developed a chart which proved so successful that I believe it to be of general interest. Although there is nothing new in the principle involved, I believe the application to be original. We find that with this device errors are rare and that the work is done in about one-quarter of the time previously taken.

The chart shown herewith is prepared for a 30-ft. roadway but can be adjusted to other widths by the simple expedient of changing the scale along the lower edge. In practice, it is fastened to a board or stiff cardboard, the bottom edge of which forms a true straightedge. A T-square with an adjustable head is used in connection with the chart.

In the field the method of use is as follows: Levels are first taken on the center line at each station where slope stakes are required, and the cut or fill at these points is calculated. The transit is then set up on the first stake and the distance from the ground to the telescope is measured and added to the center line cut at that point. This gives the height of the instrument above grade. The bottom of the graph is so graduated that if the adjustable T-square is set at the required slope and its edge brought against the figure indicating the center line cut at the instrument, the edge of the T-square will be in the same relation to the lower left hand corner of the chart as the slope line of the road section is to the transit. It is now evident that the position of any point on the ground in relation to the slope line can be determined by reading the vertical angle on the transit and measuring the slope distance. On the chart the arcs correspond to slope distance and the degree lines radiate from the left corner. A trial point is selected and these quantities spotted on the chart by intersection. If the point falls on the edge of the T-square, it is the proper location for the slope stake. If it does not, a proper correction is determined by noting the slope distance from the point along the same degree line to its intersection with the edge of the T-square, and a new trial point is selected. When the correct location has been determined, the amount of cut is determined by adding the vertical distance read on the left of the chart to the cut at the transit. The distance from the center line is read directly from the set of graduations along the top of the chart.

To illustrate, I have sketched the position of the T-square in two positions, showing its use on both the uphill and downhill sides of a section with a cut of 40 ft. at the instrument. With the T-square set at an angle corresponding to a slope of ½ to 1, the edge is placed at the 40-ft. mark along the bottom of the chart and a trial point selected. The first point, marked 1 on the chart, gave a slope distance of 60 ft. and an angle of 34 deg.

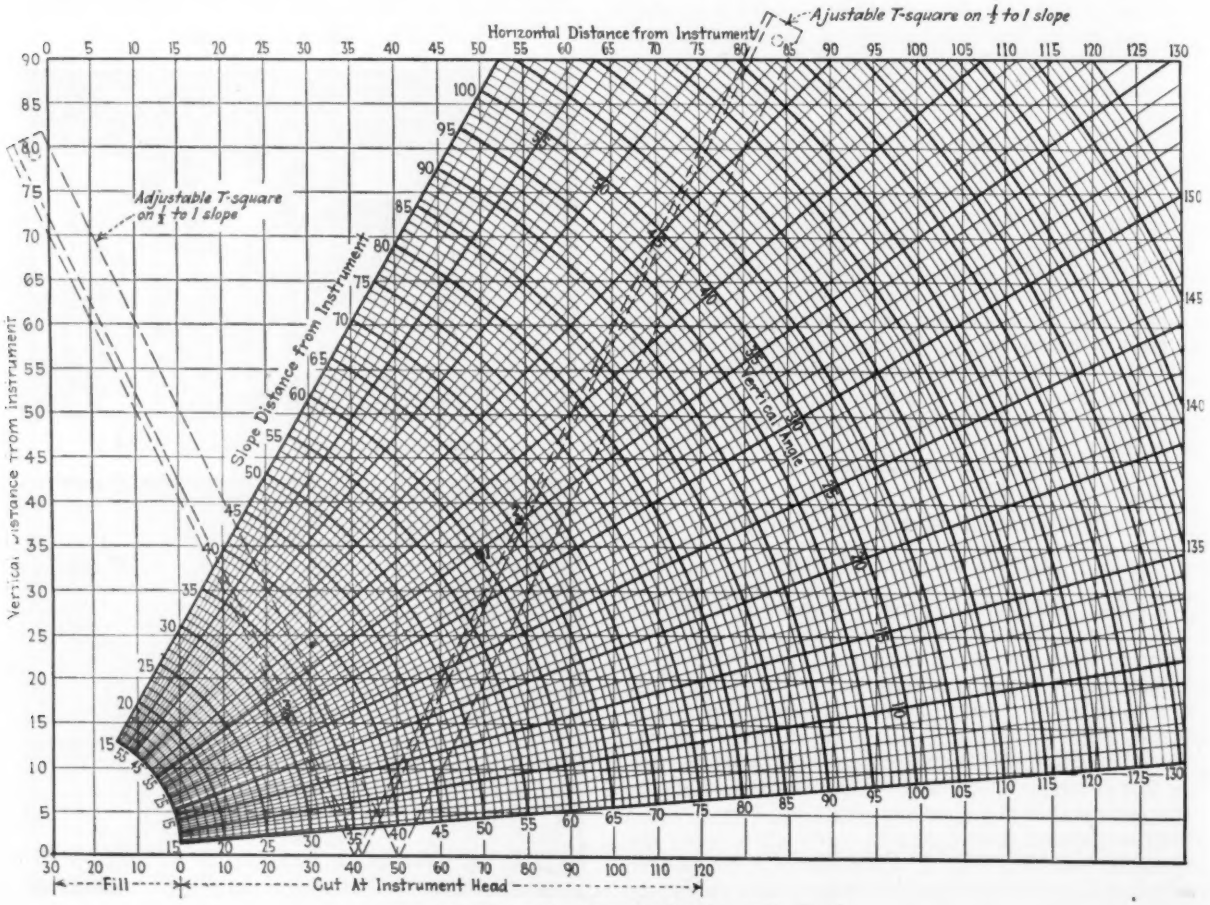

Horizontal Distance from Instrument
Adjustable T-square on ½ to 1 slope
Adjustable T-square on ½ to 1 slope
Slope Distance from Instrument
Vertical Angle
Vertical Distance from Instrument
Fill
Cut At Instrument Head

Chart Used in Setting Slope Stakes for 30-Ft. Road

45 min. This was incorrect but indicated, by following out the angle line on the chart (which approximates the ground line) that a slope distance of 65.5 ft. and a vertical angle of 35 deg. (point 2) would be about right. This point was set, and proved to be correct, indicating the cut as 40.0 + 37.6 ft., or 77.6 ft., and the distance out from the center line as 53.8 ft.

For the opposite side of the road the T-square is reversed, and, as the edge of the square is now tangent to the slope distance arcs, it is possible to pick the correct slope distance directly from the chart (point 3). In this case the distance is 31.3 ft., the angle 30 deg. The cut is 40.0 — 15.7 = 24.3 ft., and the distance out is 27.2 ft.

If the ground at the points where readings are desired is not visible from the transit, readings can be made to the level rod held on these points. The reading on the level rod is then measured down vertically on the graph from the point located by angle and distance.

Making a Snow Survey to Measure Probable Runoff

By Byron E. White
General Engineer, Utica Gas & Electric Co., Utica, N. Y.

SOME time ago the writer had occasion to check up on the amount of water contained in the snow on a watershed in order to estimate the probability of the melted snow being sufficient to fill certain storage reservoirs. In other words, a snow survey was to be undertaken. Consideration of the equipment available and of the promptness with which the survey had to be started led to the use of methods which, it is believed, will be of interest to those suddenly confronted with a similar necessity. A spare rain-gage can, 8 in. in diameter and 20 in. deep; a spring scale, 24-lb. capacity, of the type commonly used in the kitchen; and a rule were used. It so happened that a main improved highway, which was passable for automobiles, passed through that portion of the drainage area where measurements were desired. Certain spots along the road were selected where the snow appeared to be of approximately average depth. The can was plunged vertically into the snow to the ground and a trench shoveled, or stamped with the feet, to one side to permit the can to be laid over on its side. The can, with the contained snow, was then picked up and weighed, from which gross weight the net weight of the 8-in. cylinder of snow was obtained by deducting the weight of the can. Since the weight of a 1-in. depth of water 8 in. in diameter is 1.82 lb., the net weight divided by 1.82 gave the equivalent depth of water, in inches, contained in the snow. The rule was used to measure the depth of snow.

Where the total depth of snow cannot be picked up in the can the first time, the quantity first picked up is weighed and thrown out and the net weight recorded; the can is again pressed down in the same place, the remaining snow picked up, weighed, and its net weight added to that previously obtained.

By the use of an ordinary stove pipe, or any other sheet-metal container with straight sides and with or without two open ends, a consistent snow survey can be made. The weight of 1 in. of water of the cross-sectional area of the container must, of course, be computed and used as a divisor.

Letters to the Editor

A Forum for Expression of Views by Engineers and Contractors

Trends in Engineering Education

Sir—The article by Prof. Harry Tucker in *Engineering News-Record* of Nov. 20 entitled "Present Trends in Engineering Education" impressed me as being both timely and most interesting. He brings out the facts of the rapidly growing specialization and multiplicity of courses of instruction in the engineering colleges, listing about 73 special courses in 71 colleges. He doubts the advantage of an engineering student taking a highly specialized curriculum and also stresses the importance of modern languages. I fully agree with both these suggestions.

In my own opinion, a college education for an engineer should be broad and liberal, and this idea is being more and more adopted in the curricula of some of our very best engineering schools. At the age of 30 no man should be considered well educated, whether or not he is an engineer, unless he has a good knowledge of the humanities, general science, economics, literature and art, and a fair knowledge of modern languages, preferably of French and German, at least sufficient to enable him to read these languages.

Some engineering colleges attempt to give the student too much technical instruction, and I believe this is a mistake. A thorough grounding in science and mathematics would be sufficient to enable him to master the theory of any specialty he may happen to encounter in his future career. Engineering is both a science and an art. The college offers the best opportunity for the student to acquire the former, and experience in actual practice is much the best way of acquiring the latter.

Of course I realize that some will object to my views, and I offer them after many years of practice since my graduation from an engineering college.

New York City, Dec. 1, 1930. Eugene W. Stern, Consulting Engineer.

Welded Connection Design

Sir—Several questions have been asked me concerning the calculations given in my article in your issue of Sept. 18, 1930, entitled "A Rational Method of Welded Connection Design." I would like to answer all these questions in this one communication if possible.

Question 1—Regarding constant 6 in moment equation at center of illustration:

Equation reads $f_m = \frac{6 \times 16{,}800 \times 0.69}{2 \times 4^2} = 2{,}170$ lb. per linear inch.

This equation is the standard rectangular beam equation used to determine fiber stress at the extreme outer fibers in bending. The usual form of equation is $\frac{6M}{f} = bd^2$, in this case transformed to $\frac{6M}{bd^2} = f$

b being taken as 2, that is two welds, as each weld is treated as a line, since the stress to be determined is in pounds per linear inch of weld.

The 4^2 refers to the 4-in. depth of weld and, therefore, is the d^2 of the equation. 16,800 lb. is the load and 0.69 is the distance from the center of application of the beam load to the face of the column flange.

Question 2—Regarding method of calculating moment of resistance of the welds:

Experience in the welding of angles to columns has shown that perfect bearing at the lower edge of the angles does not exist. It is, therefore, necessary to neglect the bearing of the angle against the column and depend on the welds only in order to determine the moment of resistance.

Under this condition there are two beam sections to be considered, each being one weld $\frac{3}{8}$ in. wide by 4 in. deep. The dimension $\frac{3}{8}$ in. drops out of the calculations as the

stress being sought for is to be obtained in pounds per linear inch of weld. Inasmuch as the angle cannot be considered as bearing perfectly at its lower edge, the calculations of the stresses in the weld as a beam section proceed from the fundamental formula

$$\frac{6M}{f} = bd^2.$$

The center of gravity of the weld, therefore, is midway between top and bottom ends of the weld and not at the bottom end of the weld, as mentioned by two inquirers. The writer realizes that in the design of riveted brackets the bearing of the bracket against the column has been assumed by some writers as perfect, and while experience with riveted brackets does not always bear out this assumption, sufficiently satisfactory results apparently have been obtained to justify many designers in using this assumption. The writer, however, prefers to be very conservative at this stage in the introduction of welding.

Question 3—Regarding length of weld to be used in calculations:

Extensive tests indicate that it is safe to use the full length of the weld in calculations. The writer refers inquirers to reprint entitled "Tests of Metal Arc Welds" from the *General Electric Review* of June, 1929.

Question 4—Regarding arithmetical and typographical errors:

16,800/3,000 = 5.6; not 5.36 in.
5.6/2 = 2.8; not 5.36/2 = 2.68.
(16,800/3,000 = 5.6); not (16,800/24,000 = 5.36).

Schenectady, N. Y., Dec. 2, 1930. A. VOGEL, General Electric Co.

Higher Bars for Engineers Approved

Sir—My letter, published with the title "The Higher The Bars The Better The Jumper," in *Engineering News-Record* in the Dec. 11 issue, has brought several letters to my desk, and some seem to indicate or at least have the conception that my views are adverse to engineering education. Quite the contrary, I am in full accord and hearty cooperation with anything or any thesis or practice, teaching or training that will advance engineering knowledge.

I have spent a goodly portion of my life in the interest of education and am now serving on a county board without salary. This letter has made one man want to sell me a contrivance for calculating stresses in steel beams.

Salyersville, Ky., Dec. 20, 1930. W. O. DOLLARHYDE, Construction Engineer.

Flow of Water Around Bends

Sir—In your issue of Sept. 4, p. 376, I noticed an account of experiments illustrating the direction of flow of particles of water in passing round a bend. Perhaps the following notes may be of interest, on a method found to give an illustration of the flow lines in a hydraulic model.

Some three or four years ago the writer was associated with hydraulic experiments carried out in the laboratory of the University of Queensland on a model of a portion of the Brisbane River, with the object of examining the effects of a proposed shipping canal to cut off a hairpin bend of the river. There are several very sharp bends in the river in the locality, and it was proposed to build the canal on a curve of 700-yd. radius. It was especially important to investigate the probable existence or otherwise of currents which might affect shipping.

To illustrate the motion of the current at any point small crystals of potassium permanganate were used with considerable success. These were suspended at required levels by means of a fine wire—28-gage copper wire was, I think, what we used. (It is much easier to fasten the crystal to a wire than to a thread, and the wire could be twisted into a little cage to hold the crystal.) The result was a filament of pink solution leading away on the downstream side. Under the conditions of the experiment flow was steady enough for the colored filaments to exhibit but little diffusion into surrounding liquid in the first foot of its travel. Sometimes they persisted quite distinctly for at least 3 or 4 ft., although becoming somewhat faint and diffused. When flow is turbulent the filament is very rapidly lost.

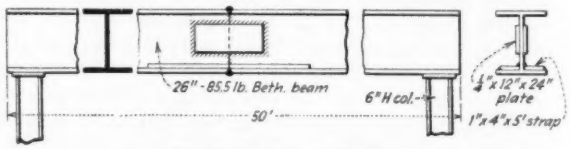
Perfect streamlining will not be found in an open channel, and it was observed that the filaments were never perfectly regular in their movements. Sometimes they would expand or contract, receive a "kink" from some disturbance, or small irregular displacement sideways from some cross-current. Incidentally, these kinks often persisted with little change for some distance, and it was found possible to measure the approximate velocity of the filaments with a stop watch.

With a judicious arrangement of small permanganate crystals suspended in the water at suitable depths or on the bottom of the model, an illustration of the hydraulic behavior at any part can be afforded so long as streamline motion is approximately preserved. The crokscrew action at bends—toward the outer bank near the surface with a return current along the bottom—was very well illustrated in a single "picture."

Brisbane, Australia, Nov. 30, 1930. E. M. SHEPHERD, Queensland Irrigation Commission.

Splicing a Beam by Welding

Sir—On p. 857 of the issue of Nov. 27 you describe a weld on a cantilever beam in Germany. The sketch herein illustrates a weld made on a beam in a service station built here a year ago. As this beam was 50 ft. long and was a Bethlehem shape that could not be rolled in time to be



Welded Splice on I-Beam

shipped with the other steel, it meant a very considerable freight charge to ship it in one length from the mill in a car by itself. So it was ordered in two 25-ft. lengths and welded on the job. The beam carries four others cantilevered out from the wall, which carry the roof framing for an awning.

While we believe that the weld itself would have been strong enough, you will note that we used two 1x4-in. straps 5 ft. long on the top of the bottom flanges, and in addition to that welded two ¼x12x24-in. plates to each side of the web.

Orlando, Fla., Dec. 1, 1930. ROBERT L. GRAVELEY, Manager, Arch Engineering & Construction Co.

Engineers Apathetic to Vital Questions

Sir—I have been awaiting with considerable interest the returns, through the "Letters to the Editor" page, on your editorial "Higher Bars for Engineers," which appeared in the Oct. 16 issue of the *Engineering News-Record*.

Thus far, and with all of the returns compiled, I believe, there has been only one published letter in answer to the article, and that one, though serving as further corroborative evidence of the inferiority complex suffered by engineers in general, can hardly be considered a discussion of the subject matter of the editorial in question.

The apathy of engineers and engineering societies to the question of most vital importance to them is difficult of comprehension, especially so in view of the fact that such absurd and inconsequential rot as the wearing of a society pin should elicit so much comment and discussion.

More general appreciation is due your most commendable editorial effiort in the interests of the profession.

Toms River, N. J., Dec. 10, 1930. E. E. SOUSLEY.

NEWS OF THE WEEK

Employment Problem To Be Attacked by American Engineers

IN ACCORDANCE with the expressed desire of Arthur Woods, chairman of President Hoover's emergency employment committee, that "American engineers contribute throughout industry to the adoption of policies which will make for better dealing with unemployment this winter and for an enlightened attack on this problem on the part of the management of our whole economic organization," American Engineering Council has undertaken to disclose the facts of unemployment and of relief effort, temporary and permanent, throughout American industry.

The work will be directed by a committee of the American Society of Mechanical Engineers, headed by Ralph E. Flanders, manager of the Jones & Lamson Machine Co., Springfield, Vt. Other members of this committee are Dexter S. Kimball, dean of the college of engineering, Cornell University; Ely C. Hutchinson, New York, editor of *Power;* Joseph W. Roe, professor of industrial engineering, New York University; C. H. Crawford, contracting engineer, New York; W. A. Starrett, president, Starrett Bros. & Eken, Inc., New York.

Industry to Be Canvassed

More than 100 subcommittees will be appointed, which will begin work at once in a canvass of all manufacturing companies in the United States employing 100 or more persons, not including public utilities. The committees will first report on conditions in concerns with 250 or more employees. Every employer will be requested to state the number of workers employed in each of the twelve months of 1929 and 1930, and to describe what regularization, if any, has been attempted.

The chief aim of the canvass will be to ascertain the extent and success of programs to regularize business. Processes concerning which knowledge will be sought embrace the leveling out of sales, production and labor turnover, and the diversification of product. Inquiry will be made into the difficulties met with by industries in sales control, in product control and operation, and in cooperation activities. The committees will also try to find out whether the procedure which works in one plant will also work in other plants.

The inquiry will extend to industry's plans for 1931, particularly as they affect expansion and contraction of operation. Enlightenment as to employment guarantees and relief measures of all kinds is another objective.

It is pointed out that there is a need for more light on the plans of individual employers in every industrial region. The policies of some farsighted enterprises, when revealed, will, it is held, provide practical experience upon which others may act. It is hoped that out of the investigation will arise a new body of economic knowledge that will enable industry to attain greater stabilization and to lessen the force of cyclical depression.

Manufacturers to Discuss Change in Road Show Policy

Details of a proposed new financial policy for the American Road Builders' Association, under the terms of which equipment manufacturers may continue to support the activities of the association without the necessity of holding a road show each year, are contained in a report which has been distributed to the members of the manufacturers division for consideration. It is expected that the plan will receive thorough discussion at the annual meeting of the division in St. Louis.

Briefly, the report proposes to limit membership in the manufacturers division to those who qualify as sustaining members, paying an annual graded fee sufficient to stabilize the finances of the association. Sustaining members would decide, in any year, whether or not to hold a road show; would receive priority in the allotment of space (at reduced rates); and would be entitled to all services now rendered by the association. Excess space available at any show would be available for nonmember exhibitors at a higher rate.

Public Works Gain 16 Per Cent on 1930 By Latest Estimates

ESTIMATES based on returns to date from the public-works survey indicate an increase of 16 per cent over the 1930 volume which is 5 per cent above that of 1929. The figures are given below:

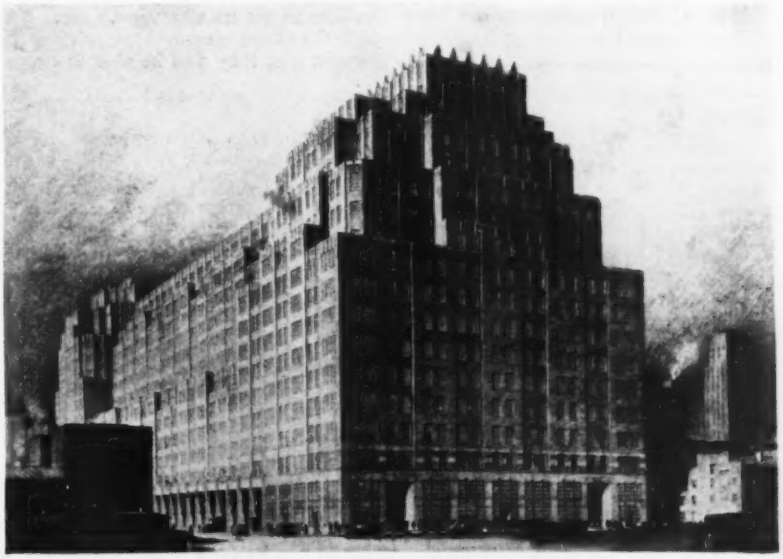
1929	$2,911,000,000
1930	3,066,000,000
1931	3,555,000,000

Revised estimates will be published in subsequent issues based on more complete returns.

New York to Have $13,000,000 Inland Freight Terminal

The Port of New York Authority has announced that it has completed negotiations with the twelve railroads serving the port district for the operation of the $13,000,000 union inland freight terminal which it will build on the block bounded by Eighth and Ninth Aves. and Fifteenth and Sixteenth Sts., and that the railroads have signed an agreement to use the building as their central point in the delivery and collection of less-than-carload freight bound to and from New York. Under the agreement it is stipulated that the railroads shall organize an agency to operate the terminal, and the Port Authority pledges itself to build other terminals if the first experiment proves successful and need for additional facilities arises.

It is expected that shippers and con-



Design of New York's Inland Freight Terminal

signees in the district will be served more efficiently and without added cost by the creation of a central delivery point from which the railroads will truck the freight which they must carry to their rail ends for outbound delivery or deposit inbound freight for collection by the trucks of consignees. The Port Authority is preparing to clear the site and has announced that it has executed a contract with the Klosk Contracting Co. to raze buildings now standing upon it. The contract with the railroads is dated Dec. 31 and provides that the terminal shall be completed within sixteen months of that date.

30th Anniversary Medal Given to Walter Kidde

On Dec. 22 the 30th anniversary of the founding of Walter Kidde & Co., Inc., and Walter Kidde Constructors, Inc., both of New York City, was celebrated with suitable ceremonies, during which the medal shown herewith was presented to Mr. Kidde by his associates. Starting with an organization comprising only himself, there is now a group of about 50 engineers and many workmen engaged in the activities of the two corporations. The designation "Engineer-Constructor" on the medal is a title which Mr. Kidde coined in 1899 when first starting in business for himself.

Mr. Kidde is a resident of Montclair, N. J., and has served his state and community in a number of diversified undertakings. Besides being president of the two Kidde corporations, he is chairman of the Sacks-Barlow Foundries in Newark, N. J., director of the Jenkins Manufacturing Co. in Bloomfield, N. J., and treasurer of the Vreeland Apparatus Co.

Federal Funds for New Road Projects Total $235,383,877

FEDERAL funds available for new road projects on the federal-aid system now total $235,383,877, Secretary of Agriculture Hyde announces. Of this amount $80,000,000 was provided by the act of Congress of Dec. 20 for emergency construction to increase employment. This fund may be used by the states in place of state funds to match regular federal-aid funds previously authorized and apportioned. If all states use their full apportionment, the $80,000,000 may be used to match $88,568,446 of other available federal-aid funds, which would permit expenditure of $168,568,446 without the use of any state funds.

The advances of emergency funds from the $80,000,000 appropriation (allocation of which to the states was tabulated in the Jan. 6 issue, p. 41) will be limited to the sums actually paid for work performed under new contracts before Sept. 1, 1931. Such advances are to be reimbursed to the federal government over a period of five years, commencing with the fiscal year 1933, by making deductions from regular apportionments of future federal-aid authorizations. No part of such funds are available for road projects on which convict labor is used.

Under regulations promulgated by the Bureau of Public Roads the $80,000,000 federal emergency fund for roads may be regarded as state funds and may be applied on any federal-aid project, regardless of the $15,000 per mile limitation. This is expected to result in the use of a large portion of the emergency fund for the widening of roads and for difficult construction due to swamp conditions or where heavy grades or fills are required. This ruling on the part of the bureau makes it practically certain that each state will be able to use its allocation. More than half the states already have advised the bureau that they will be able to expend the emergency money prior to Sept. 1. If it should become apparent at any time that a state will not be able to use all of the emergency fund, the act provides for its immediate reallocation to states in a position to use it.

If the emergency fund is used to match the maximum of $88,568,446 of regular federal-aid funds, there will still be available $66,815,431 of the regular funds. To match this amount will require a minimum of $65,352,801 of state funds.

Summarizing these figures, there is now available $235,383,877 of federal funds which may be expended on new projects in conjunction with a minimum of $65,352,801 of state funds, making a minimum total of $300,736,678. The details by states are given in the accompanying table.

Prevailing Wage and 8-Hour Law Upheld for N. Y. Grade Crossings

The validity of the act passed last year by the New York state legislature providing that the eight-hour law and prevailing wage rate law should apply to all grade-crossing elimination work performed under the $300,000,000 state bond issue was upheld in part by a decision handed down Jan. 2 by Justice Ellis J. Staley of the state supreme court. The law was held valid in so far as it applies to private contractors on grade-elimination work, but was held invalid concerning employees of railroads on similar work on the ground that railroad employees are already subject to wage and time restrictions imposed by acts of Congress. Suits to test the constitutionality of the law have been brought by all of the railroads operating in the state, declaring that the act would increase the cost of grade separation, of which the railroad pays 50 per cent. In a lengthy decision Justice Staley establishes grade-crossing elimination work as public work and therefore subject to acts of the legislature.

An appeal will probably be taken.

State	Possible Expenditure Using Only Federal Funds	Federal-Aid Funds Which Must Be Matched With State Funds	Minimum Amount of State Funds Required to Match Federal-Aid Funds	Total of Federal and State Funds
Alabama	$3,397,290	$3,583,897	$3,583,897	$10,565,084
Arizona	3,570,155	.....	.....	3,570,155
Arkansas	2,776,314	1,391,983	1,391,983	5,560,280
California	7,535,753	.....	.....	7,535,753
Colorado	3,439,398	1,918,620	1,497,726	6,855,744
Connecticut	1,040,982	742,154	742,154	2,525,290
Delaware	800,000	218,547	218,547	1,237,094
Florida	2,172,876	1,554,271	1,554,271	5,281,418
Georgia	4,155,992	2,595,140	2,595,140	9,346,272
Idaho	2,559,764	292,971	190,320	3,043,055
Illinois	5,800,232	3,735,830	3,735,830	14,271,892
Indiana	4,091,858	2,395,616	2,395,616	8,883,090
Iowa	4,232,738	292,975	292,975	6,078,688
Kansas	4,384,602	1,929,206	1,929,206	8,243,014
Kentucky	3,009,430	55,015	55,015	3,119,460
Louisiana	2,295,854	1,373,431	1,373,431	5,042,716
Maine	1,431,598	1,202,345	1,202,345	3,836,288
Maryland	1,357,504	320,392	320,392	1,998,288
Massachusetts	2,282,920	1,704,148	1,704,148	5,691,216
Michigan	5,042,764	1,831,183	1,831,183	8,705,130
Minnesota	4,499,986	497,407	497,407	5,494,800
Mississippi	2,869,472	4,076,099	4,076,099	11,021,670
Missouri	5,053,646	774,286	774,286	6,602,218
Montana	3,852,373	2,528,171	1,938,562	8,319,106
Nebraska	3,416,062	2,435,499	2,435,499	8,287,060
Nevada	2,937,283	.....	.....	2,937,283
New Hampshire	800,000	172,280	172,280	1,144,560
New Jersey	2,215,614	1,440,560	1,440,560	5,096,734
New Mexico	3,595,277	59,754	33,978	3,689,009
New York	8,101,132	7,723,840	7,723,840	23,548,812
North Carolina	3,853,550	2,515,907	2,515,907	8,885,364
North Dakota	2,597,064	1,179,804	1,179,804	4,956,672
Ohio	5,997,076	1,526,573	1,526,573	9,050,222
Oklahoma	4,309,510	243,159	196,550	4,749,219
Oregon	3,107,298	.....	.....	3,107,298
Pennsylvania	7,025,886	1,854,144	1,854,144	10,734,174
Rhode Island	800,000	226,545	226,545	1,253,090
South Carolina	2,229,272	186,049	186,049	2,601,370
South Dakota	3,008,709	612,012	490,117	4,110,838
Tennessee	3,483,764	1,545,042	1,545,042	6,573,848
Texas	10,176,160	5,148,001	5,148,001	20,472,162
Utah	2,445,026	.....	.....	2,445,026
Vermont	800,000	213,889	213,889	1,227,778
Virginia	3,001,004	750,048	750,048	4,511,100
Washington	2,761,097	1,054,900	899,704	4,715,701
West Virginia	1,750,768	232,344	232,344	2,215,456
Wisconsin	3,984,820	598,624	598,624	5,182,068
Wyoming	2,708,573	.....	.....	2,708,573
Hawaii	800,000	1,452,770	1,452,770	3,705,540
Total	$168,568,446	$66,815,431	$65,352,801	$300,736,678

Floodway Costs May Require Modification of Mississippi Plan

SHOULD it be held that the federal government must pay for flowage rights in the Boeuf and Atchafalaya floodways, the cost of the existing plan will be raised to a point where it will approach that of the combined reservoir and floodway plan submitted by the Louisiana board of engineers. This statement was made by Major Gen. Lytle Brown, Chief of Engineers, U. S. Army, in testimony before the House appropriations committee made public on Jan. 5. The question of whether or not the government is to pay for flowage is now before the courts.

General Brown informed the committee that the army engineers have made a study of the proposals of the Louisiana engineers for reservoirs in the Arkansas, White and Red rivers. This phase of the flood-control problem is now being reconsidered, he stated. He added that the Mississippi River Commission has made its report on the matter and this report has been turned over to the board of engineers for rivers and harbors. General Brown will not give it his final attention until the board has finished with it. The proposed reservoirs would eliminate the Boeuf floodway. While not desiring to commit himself as to the practicability of these reservoirs until he has submitted his report on the matter, General Brown told the committee that the storage facilities they would provide would lower the flood height of the Mississippi by 7 ft.

Referring to the Jadwin flood-control plan, General Brown stated that it is more feasible and less costly than other proposals that have been submitted, but that it is possible that changed conditions, such as the necessity of paying for flowage rights, might make a modification of that plan desirable.

General Brown's testimony was taken in connection with the appropriation of $35,000,000 for flood-control work.

New York Steel Erectors Face Injunction Against Open Shop

A preliminary injunction sought by the International Association of Bridge, Steel and Ornamental Iron Workers restricting the Structural Steel Board of Trade (New York City) from using other than union labor was granted Jan. 3 by Justice William Harmon Black of the New York supreme court. The action is result of a suit, argued on Dec. 11, 1930, in which the iron workers are asking $3,500,000 damages from the Structural Steel Board of Trade, alleging violation of a contract dated May 12, 1930. Reasons for the suit were given in these pages Nov. 27, 1930, p. 866. The contract was to have ended a 25-year dispute between the union iron workers and the steel board, during which time the eighteen members of the latter have used non-union labor in the metropolitan area.

According to the contract all steel workers employed by members of the board were to be unionized. The contract was never formally signed, and, according to contentions of the steel board, never had the full approval of the membership of the Structural Steel Board of Trade because of certain disputed clauses. Alfred E. Smith, Secretary of Labor James J. Davis and William Green, president of the American Federation of Labor, have all acted as arbitrators in an unsuccessful effort to settle the disputed points. On this basis the Structural Steel Board of Trade claims the contract never went into effect, and have not complied with its terms. The union contends that the contract is valid, since it was drawn up by Charles L. Eidlitz, head of the steel board, at the request of the board.

Damages asked by the union are for alleged loss sustained by union members due to the continuance of the open-shop policy after the contract was supposed to be in effect. In granting a preliminary injunction Justice Black declares that the contract is valid and that the steel erectors are bound by it.

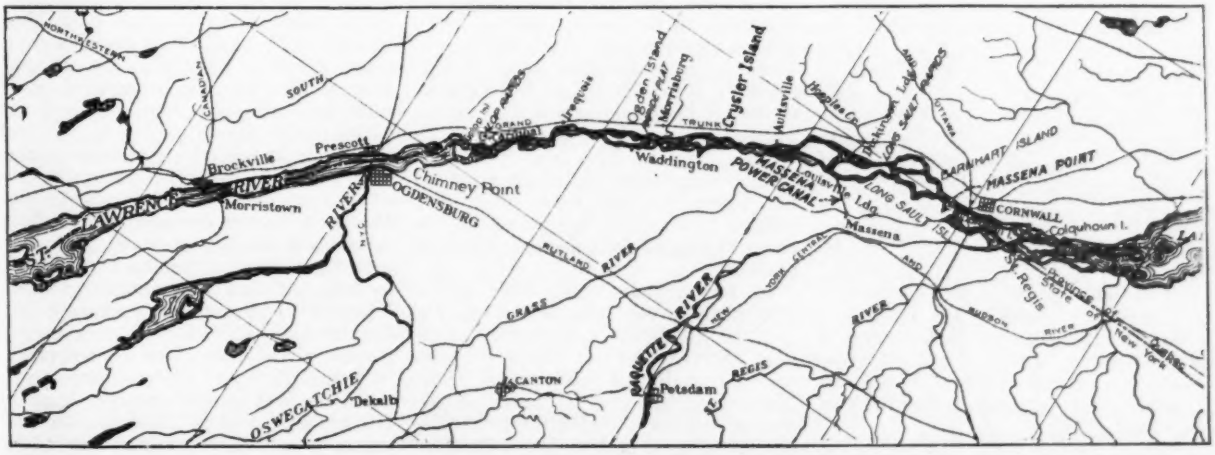
Single-Stage Power Development on the St. Lawrence River Recommended

New York State Board of Engineers Favors Development of the International Section of the River in One Plant to Be Built in Two Steps

DEVELOPMENT of the power in the international section of the St. Lawrence River in a single plant rather than in two plants, as proposed by Canadian engineers, is the recommendation to be made to the New York state legislature by its St. Lawrence Power Development Commission in a report to be submitted to the legislature on Jan. 15. Details of the commission's engineering board report have been made public in advance of the submission of the commission's complete report. The engineering board consists of Lieut. Gen. Edgar Jadwin, U. S. Army, retired; Oscar G. Thurlow, vice-president, Southern Division, Allied Engineers, Inc., Birmingham, Ala.; Silas H. Woodard, consulting engineer, New York, and Frederick Stuart Greene, superintendent of public works of the State of New York.

Last year the New York state legislature appointed a commission to look into the matter of developing power in the international section of the St. Lawrence River through a state-controlled agency and to report back to the legislature this year as to its findings upon the economic possibilities of such a power development. The commission was empowered to employ experts to review existing plans for power developments or to prepare their own plans and also to make a survey of the market for the power which might be developed. Two boards were appointed for this purpose several weeks ago.

The international section of the St. Lawrence River extends from the lower



International Section of the St. Lawrence River

end of Lake Ontario down to the neighborhood of Cornwall. Most of the fall is concentrated in the section between Ogdensburg and Cornwall. Numerous projects for the development of power and for improving navigation in this section of the river have been considered by international commissions, the most recent one being the report of the joint board of engineers submitted to the two governments late in December, 1926. That board recommended two schemes for development, one a single-stage development with a dam and power houses in the vicinity of Barnhart Island above Cornwall, and the other a two-stage development with one power house at Barnhart Island and a second one at Ogden Island above Morrisburg. The single-stage development was favored by the American engineers and the two-stage development by the Canadian engineers on the joint board.

Recently engineers of the Ontario Hydro Electric Power Commission fixed upon a location for the second dam at Crysler Island instead of at Ogden Island.

Single-Stage Development Favored

The New York state board favors a single-stage development with a dam at Massena Point, somewhat below Barnhart Island. It recommends building the dam in two steps, the first to develop a head of 50 ft. producing 600,000 hp. at an estimated cost of $80,000,000. Subsequently as more power is required, the dam can be raised to develop the full head of 85 ft. at an additional cost of $91,000,000. The completed plant will produce 2,200,000 hp. The board believes that this plan will cost $70,000,000 less than the double-stage development and will produce more power. It also states that its project will flood less land than the single-stage development proposed in 1926, one of the major objections to that plan.

The total cost for full power development, including work necessary to coordinate power and navigation, is estimated at $171,000,000, including interest during construction. The works necessary for navigation alone are estimated to cost an additional $60,000,000, inclusive of interest during construction.

One major advantage claimed for the present plan is that the power houses can be built on dry land rather than in the river as proposed in the 1926 plan. However, as Massena Point is on the American side, some objection is expected to be raised to the building of the Canadian power plant on the American side. To meet this objection the board has considered a Massena Point-Barnhart Island plant. It will not produce quite as much power. A control dam at Galop Island is recommended.

The dam proposed by the board consists of earth dikes on high ground, a rockfill section across the main river near the middle of Barnhart Island and also across the channel to the north of Barnhart Island.

Five or six years will be required for the first step after construction is authorized.

Vehicular Tunnel to Be Built Under River Schelde at Antwerp

Contract for the construction of a vehicular tunnel under the River Schelde at Antwerp has just been awarded to the Belgian contracting firm Pieux Franki, of Liége, under plans and specifications prepared by Parsons, Klapp, Brinckerhoff & Douglas and Ole Singstad, of New York. The tunnel will be a single tube about 6,000 ft. long between portals and having a two-lane roadway 22 ft. wide with a patrol footwalk on one side. It will consist of a steel or cast-iron shell lined with concrete and equipped for forced ventilation. The cost will be around $15,000,000. The project is a joint provincial and city undertaking, administered by a government commission. Its purpose is to connect the city, on the right bank, with suburban territory on the left bank, for the development of vacant lands there. These lands, acquired by the commission, are to repay the tunnel cost.

Restraint of Trade Charged to Asphalt Roofing Institute

Following an investigation into the activities of the Asphalt Shingle and Roofing Institute, New York City, the U. S. department of justice on Dec. 30 filed in the federal court for the Southern District of New York a bill in equity against that organization and 41 companies and individuals connected with it alleging the existence of a combination in restraint of trade. The bill seeks to enjoin various practices said to be in violation of the Sherman anti-trust act.

The petition charges the existence of activities tending to fix uniform and non-competitive prices in the sale of the non-patented asphalt shingle and roofing products manufactured by the defendant companies. It sets forth as an exhibit a copy of the present plan of operation of the institute which contains provisions for reporting to the defendants the current prices of their competitors and for each company's adherence to the prices reported by it. It also contains agreements fixing uniform maximum discounts to the various classes of trade, definitions of the classes of customers and the selection by agreement of those deemed qualified for the various classes. This plan also contains a comprehensive freight equalization agreement and many other provisions relating to the prices of the competitors and their methods of doing business.

In an announcement made public subsequent to the filing of the suit the institute sets forth a new plan of operation, effective Jan. 1, which provides only for continued publicity of prices, discount allowances, and terms of sale among members; outlines merchandising procedures, and pledges adherence to the published code of ethics. Other features of the old plan are eliminated.

Four-System Railway Plan Is Now Before the Commerce Commission

Washington Correspondence

PLACED in the hands of the Interstate Commerce Commission this week, the four-system plan of railroad consolidation promises great potential benefits to the railroads operating in Eastern territory, but any immediate stimulus to industry and business generally that may result will be due almost wholly to the psychological effect of President Hoover's announcement. With a definite objective in view the four trunk lines may release more funds for construction and improvement and betterment of their lines, but they recognize that the commission and not the President is the final authority.

Approval Probable

The first reaction to Mr. Hoover's announcement was that under the circumstances the commission could do nothing else than rubber-stamp the plan with its O.K. Confidence is still expressed that the plan will be approved by the commission in due course, but a study of the situation indicates definitely that the commission is in a position to act with the utmost independence without embarrassment to individual members. The opinion first expressed was that the commission, although nominally an independent agency of the government, undoubtedly would approve the plan in short order, as appointment of its members rests with the President, but since then it has been recalled that Mr. Hoover already has appointed five of the present members of the commission and that, even though he serves a second term, the reappointment of a majority will not fall to him.

Because of the comprehensive character of the plan it is believed that at least a year will be required for its official consideration and authorization. If organized opposition develops, the formal proceedings before the commission may stretch over an even longer period. L. F. Loree may fight dismemberment of the Delaware & Hudson system. The Taplin brothers may continue to press their plan for a fifth system, although the impression prevails in Washington that they will be called off by the Pennsylvania. Labor may raise its voice in opposition to the plan unless the terms of the agreement to protect employees referred to by President Hoover are satisfactory. The railroad brotherhoods state that this agreement has not yet been presented to them and they have announced their intention to press for enactment by Congress of legislation to protect employees of railroads which are embraced in consolidations. Many communities doubtless will protest against specific features of the plan. Philadelphia, for example, will fight to the last ditch allocation of the Reading to the Baltimore & Ohio, as this will reduce from

three to two the number of trunk lines serving that city, while several other cities now having three would be served by four roads.

The Baltimore & Ohio probably has more to gain from the four-system plan as it has finally crystallized than the Pennsylvania, the New York Central, or even the Chesapeake & Ohio-Nickel Plate. The entire control of the Reading will enable the B. & O. to perfect its new short route between Jersey City and Chicago with the construction of a line across the present gap between the Buffalo & Susquehanna and the Reading.

In a letter submitted by the Eastern railway executives to the Interstate Commerce Commission for its information the general understanding reached by them as to the allocation of the principal roads among the four systems is as follows:

Allocation of Roads

To the Baltimore & Ohio—the Ann Arbor, the Reading and Central Railroad of New Jersey, the Western Maryland, the Buffalo, Rochester & Pittsburgh, the Buffalo & Susquehanna, the Lehigh & Hudson River and the Chicago & Alton.

To the New York Central—the Delaware, Lackawanna & Western and a direct connection with the Virginian Railway at Deepwater, including joint rates and routes over the Virginian.

To the Pennsylvania—the Wabash, the Detroit, Toledo & Ironton and the Norfolk & Western.

To the Chesapeake & Ohio-Nickel Plate—the Hocking Valley, the Erie, the Bessemer & Lake Erie, the Pere Marquette, the Wheeling & Lake Erie, the Chicago & Eastern Illinois and the Lehigh Valley, with trackage rights to the Pennsylvania on the Lehigh Valley into Bethlehem, Pa.

Conferences to Be Continued

The general plan as outlined to the commission recommends the assignment of the following roads to the four systems jointly: Lehigh & New England, Delaware & Hudson, Monongahela, Montour, Pittsburgh & West Virginia and Pittsburgh, Chartiers & Yougiogheny. The Grand Trunk Western lines would remain with the Canadian National. Pennsylvania's use of trackage on the Nickel Plate between Ashtabula and Brocton, and the disposition of the Virginian now are in process of determination. The commission was advised that conferences of the rail executives will be continued for the purpose of dealing with the short lines and various trackage and terminal arrangements essential to rounding out the four systems. The present open gateways on all railroads are to be maintained.

As the four-system plan involves abandonment of the commission's own plan for a fifth system in Eastern territory and otherwise departs from the general plan published in December, 1929, the first step on the new program probably will be the filing of petitions for modification of this plan.

Progress Made on Montreal's $50,000,000 Railroad Terminal

Good progress has been made with the various piledriving, excavation and bridge contracts which the Canadian National Railways has awarded in connection with its $50,000,000 terminal project in Montreal. A start will be made immediately on the erection of a temporary wooden bridge at Lagauchetiere St. 100 ft. east of St. Monique St. to carry street traffic during the excavation work. Work is progressing according to schedule on the preliminaries for construction of the main viaduct from the central station area toward Victoria Bridge, where piledriving and concrete pouring have been under way for some time.

WASHINGTON NOTES

By PAUL WOOTON
Washington Correspondent

Bidders Must Prove Capability; Illinois Waterway Work to Start; Bidding for Engineering Service

TO EXPEDITE the letting of contracts undertaken in connection with the emergency construction appropriation bill, the Corps of Engineers is insisting that bidding be limited to contracting firms with sufficient capital and plant to start operations immediately. District engineers have been reminded that the work is being undertaken in order to accelerate such construction projects as will increase public employment. They have been instructed to reject a bid unless the bidder can show that he has the necessary capital, equipment and experience and that he is not already obligated for the performance of as much work as he will probably be able to do during the period contemplated by the advertisement.

Major Gen. Lytle Brown, Chief of Engineers, has ordered that operations in the Mississippi Valley be continued until the peak of the high-water period. Ordinarily the work on riverbank levees and other operations near the river are stopped when the water begins to rise in December or January. Some of the district engineers in the lower valley have been observing the usual procedure and have curtailed their forces, because additional expense is involved in the work during high water. General Brown believes, however, that the emergency work should be pushed with vigor, even though it necessitates a slight increase in cost.

Illinois Waterway Work To Be Pushed

Completion of the Illinois waterway a year ahead of schedule is predicted by members of the rivers and harbors committee as the result of the announcement that the secretary of war has approved plans and procedure for the work. The last estimate made by the army engineers was that the work would be finished in the latter part of 1933. It is now believed that the project will be completed and in operation by the end of 1932.

Although the federal government was authorized in the rivers and harbors act to take over the portion of the work being done by Illinois, no appropriation was made available. Now that the plans for prosecuting the work have been approved, operations can be started at once by utilizing funds made available in the emergency construction appropriation bill. Of the $22,500,000 appropriated under this measure for rivers and harbors work, $1,200,000 has been set aside for use on the Illinois waterway. The regular war department bill, now before the House, provides $3,950,000 for new work and $110,000 for maintenance work on the Illinois waterway. This money will not be available, however, until July.

In order to expedite the work as much as possible, the funds that can be used at the present time will be employed for starting continuing contracts. This will enable the government to start operations on a larger scale.

Bids have been advertised for part of the work and specifications have been sent out by the war department for a lock and dam in the vicinity of Dresden Island, to cost ultimately more than $1,000,000.

Much New Equipment Needed

As the result of an expedited rivers and harbors and flood-control program provided for in the war department and emergency construction appropriation bills, the government and private contractors are faced with the necessity of spending large sums for mechanical equipment. Plans already completed call for the expenditure of $3,000,000 by the government during the next year for new plant and repairs. In addition, it probably will be necessary to spend $2,500,000 for new equipment for work on the Missouri River. It is estimated that contractors regularly engaged in river work will spend several millions for new equipment.

May Abandon Engineering Bids

Legislation looking to the removal of the requirement by the government of competitive bidding for surveys of building sites and for engineering services has been delayed awaiting the securing of a special rule. The bill also provides for the obtaining of outside engineering, technical, architectural and other professional services so as to make it possible to speed up the federal building program. The measure also authorizes the secretary of the treasury to restrict bidders on construction to such persons, firms or corporations as possess the qualifications deemed necessary to carry forward the work in a manner that will be in the public interest.

As the present law has been interpreted by the comptroller general, the government must secure bids for engineering services. This is opposed by the contracting agencies of the government. Their representatives convinced members of the committee on public

buildings and grounds that it is in the public interest to leave such services to the judgment of the department head having jurisdiction. At the same time, these agencies are anxious to have more authority under the provision for letting contracts. At present difficulties and delays always result when the contract is not let to the low bidder.

Personal Notes

ROBERT ISHAM RANDOLPH, consulting engineer, Chicago, has been nominated, tantamount to election, to succeed himself as president of the Chicago Association of Commerce.

FRANK J. OLERI has been appointed engineer for the township of Guttenberg, N. J. Mr. Oleri acts in the same capacity in West New York, where he lives.

ANDREW F. ALLEN, engineer in the division of sanitation of the New York state health department, has been assigned to a permanent office in Buffalo in the interest of more efficient operation of water and sewage-disposal plants in Erie County.

GEORGE M. PURVER, consulting engineer, of New York, has been designated contact engineer on the noise abatement program for the board of transportation, city of New York. Mr. Purver was in the service of the Public Service Commission, New York City, from 1908 to 1917, designing subways and elevated railroads.

J. WALTER ACKERMAN, city manager of Watertown, N. Y., for nine years, became city manager of Fall River, Mass., on Jan. 3. Mr. Ackerman, before becoming city manager of Watertown, was in charge of the Watertown waterworks and also served as head of Auburn (N. Y.) water-works.

ARCHIBALD BLACK has resigned as president of Black & Bigelow, Inc., air transport engineers, of New York, and A. A. BIGELOW, formerly vice-president, has been elected president in Mr. Black's place. Effective Jan. 1, the name of the firm has been changed to A. A. Bigelow & Co., Inc.

JAMES F. COLLINS, for more than a year director of the California department of professional and vocational standards, has tendered his resignation, effective Jan. 5. One of the principal requirements of Mr. Collins' position has been the direction of the contractors' license law, under which approximately 25,000 contractors have been registered.

R. L. PEARSON, chief engineer of the New York, New Haven & Hartford Railroad since October, 1929, has been promoted to be assistant general manager. Mr. Pearson has been connected with the railroad for more than 26 years. In consequence of this promotion E. E. OVIATT has been made chief engineer, A. L. BARTLETT engineer of maintenance-of-way, and W. T. DORRANCE assistant to the chief engineer.

Obituary

FRANK R. DELEUIL, president of the Struck Construction Co., Louisville, Ky., general contractors, died on Dec. 27, after a lingering illness of three years. Mr. DeLeuil was 57 years of age.

FRANK E. SCHNEIDER, 67 years of age, who was president of the old F. E. Schneider Paving Co., Baltimore, which laid most of the asphalt paving in Baltimore for several years, died recently.

HARRISON R. VAN DUYNE, of Newark, N. J., a member of the North Jersey Transit Commission since last April, died suddenly on Dec. 29. Mr. Van Duyne, who was 56 years old, located in Newark immediately after his graduation from Cornell and had been engaged in civil engineering all his life.

EDWARD CARLOS CARTER, consulting engineer and formerly chief engineer of the Chicago & Northwestern Ry., died at his home in Evanston, Ill., on Dec. 23. He was graduated from Rensselaer Polytechnic Institute in 1876 and the greater part of his career was in the service of the Chicago & Northwestern Ry., of which he was principal assistant engineer and chief engineer for 27 years, retiring in 1914. He was a member of the American Society of Civil Engineers and honorary member and past-president of the Western Society of Engineers.

THEODORE B. BRYDON, head of the construction firm of Theodore B. Brydon & Son, of Indianapolis, Ind., and the builder of many of the city's largest apartment houses, died recently of pernicious anemia. Mr. Brydon was 54 years old.

GEORGE A. FERGUSON, senior member of Ferguson & Edmondson Co., railroad contractors, of Pittsburgh, Pa., died at his home in Shinnston, W. Va., on Dec. 21. Mr. Ferguson, who was 66 years old, had been engaged in railroad construction practically all his life, having started his career in Iowa in the '70s. He was the last of four Ferguson brothers, who were prominent in railroad construction in the West and Middle West. George Ferguson, together with the firm of Ferguson & Edmondson Co., had a prominent part in construction projects for the Baltimore & Ohio, Erie, Pennsylvania, New York Central and Wabash railroads.

SAMUEL M. PURDY, construction engineer, department of city transit, Philadelphia, Pa., died on Jan. 2 of heart disease. Mr. Purdy, a native of Lake Providence, La., was 56 years old. After his graduation from Cornell in 1896 he became successively rodman for the U. S. Deep Waterways Survey, New York State; instrument man, Chicago & Northwestern Ry.; assistant engineer, Niagara Falls Hydraulic Power & Manufacturing Co.; assistant engineer, bureau of filtration, city of Philadelphia; division engineer, Philadelphia Rapid Transit Co.; chief engineer, E. E. Smith Contracting Co., and construction supervisor, J. G. White Engineering Corp. He had been connected with the Philadelphia department of city transit for many years.

EDWARD G. CONNETTE, of New York City, died on Dec. 30 at the home of his son in Lockport, N. Y., where he was spending the Christmas holidays. Mr. Connette was 67 years old. Early entering the public utility field, he was from 1890 to 1900 superintendent and later general manager of the United Electric Railways at Nashville, Tenn. Later he was general manager of the electric railway companies centering in Worcester, Mass., and in 1909 he became transportation engineer of the Public Service Commission, First District, New York State, having charge of the appraisal of properties and engineering work incident to elimination of grade crossings. Still later he was president and director of the United Gas & Electric Engineering Corporation, United Gas & Electric Corporation, International Railway Co., Harrisburg Light Co., Elmira Railway & Light Co., and Lockport Light & Gas Co., and vice-president of the Wilkes-Barre Co. At the time of his death he was connected with the J. G. White Management Corporation, of New York City.

SOCIETY CALENDAR

AMERICAN ROAD BUILDERS ASSOCIATION, Washington; annual convention and road show, St. Louis, Mo., Jan. 10-16.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York City; annual meeting, New York, Jan. 21-23.

AMERICAN WOOD PRESERVERS' ASSOCIATION, Washington; annual convention, Philadelphia, Pa., Jan. 27-29.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA, Washington; annual meeting, San Francisco, Jan. 26-28.

ENGINEERING INSTITUTE OF CANADA; annual meeting, Montreal, Feb. 4-6.

NATIONAL CRUSHED STONE ASSOCIATION, Washington; annual convention, St. Louis, Mo., Jan. 19-22.

NATIONAL PAVING BRICK ASSOCIATION, Washington; annual meeting, Pittsburgh, Pa., Feb. 4-6.

NATIONAL READY MIXED CONCRETE ASSOCIATION, first annual convention and exhibit, St. Louis, Mo., Jan. 26.

NATIONAL SAND AND GRAVEL ASSOCIATION, Washington; annual convention, St. Louis, Mo., Jan. 27-29.

KENTUCKY-TENNESSEE SECTION, American Water Works Association, will hold its annual meeting in Nashville, Tenn., Feb. 5-7. F. C. Dugan, Louisville, Ky., is secretary.

NEW ENGLAND WATER WORKS ASSOCIATION at its meeting on Jan. 14 will listen to a paper on "Water Hammer in Pipe Lines, Its Causes, Manner of Action and Effects," by H. K. Barrows, consulting engineer and professor of hydraulic engineering, Massachusetts Institute of Technology. There will also be a general discussion on "Thawing Frozen Water Pipes," which will be opened by President Finneran.

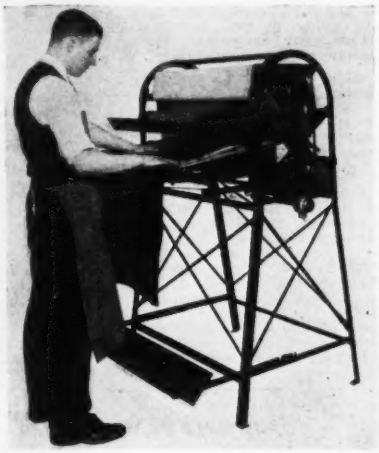
NORTHWEST BRANCH, Associated General Contractors of America, will hold its annual convention in Seattle on Jan. 9-10. W. D. Shannon, chief engineer of the Stone & Webster Corporation, will give an illustrated lecture depicting the progress of the work on the Rock Island power project on the Columbia River.

PENNSYLVANIA SAFETY CONFERENCE will be held Feb. 19 and 20 in Harrisburg under the auspices of the state department of labor and industry. This is the annual statewide Safety Conference and it is announced that a program of unusual interest is being prepared.

Construction Equipment and Materials

Drier Speeds Print Production

Drying of blueprints, negatives, blue and brown line prints and (when equipped with a chromium-plated cylinder) photo prints in sizes up to 24 in. is the function of the Junior



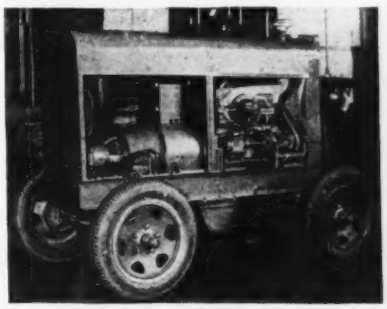
Small Drying Machine

sheet drier developed by the C. F. Pease Co., 813 North Franklin St., Chicago, Ill. This machine, in design, closely resembles the larger units produced by this company. Prints are fed into the drier over a brass scraper rod and up an inclined feed table which drains the water away from the drying drum. Surplus water is collected in an adjustable drip pan directly beneath the feed table. After drying, prints are automatically returned into an adjustable tray at the front of the machine. The revolving copper drying drum, which can be chromium plated to resist chemicals, is furnished with either gas or electric heating elements. A ¼-hp. electric motor with variable gear drive gives the machine two speeds, 2 or 3 ft. per minute.

Generators for Welding

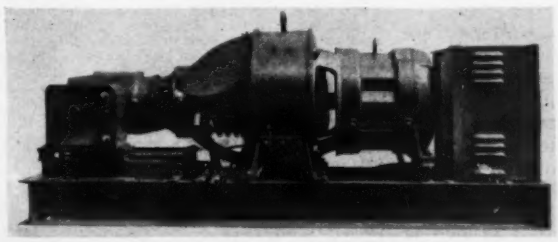
The gradual trend toward higher welding currents for use with large-size metallic and carbon electrodes to provide increased welding speed has brought about the development of a 600-amp., single-operator, FlexArc motor-driven welder by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. This machine is designed to handle various sizes of electrodes, including bare and special coated rods, requiring current values up to 750 amp. It is available with electric motor or gasoline engine drive and in stationary or portable models. Motor and generator have a common shaft with two bracket-type bearings and a two-bearing exciter overhung from commutator end of main generator. A Westinghouse Flexactor, which provides a non-surge welding circuit, is mounted on the welded channel base under the exciter. Control units, including a single-dial field rheostat, ammeter, voltmeter and starter pushbutton, are all inclosed in a sheet-metal cabinet mounted beside the welding outlet leads. The main generator operates on the variable-voltage, constant-current principle with a separately excited shunt field and a bucking series field.

Westinghouse has also announced a line of special portable welding units particularly adaptable for road service in localities beyond the reach of electric power lines. These units are equipped with pneumatic-tired wheels and an



Portable Welding Set

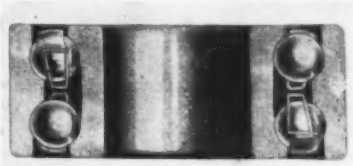
oversize exciter for auxiliary power purposes, and are available in ratings of 200, 300, 400 amp. and larger. The machine illustrated is a typical example. It consists of a standard single bearing 300-amp. single-operator FlexArc welding generator coupled to a four-cylinder gasoline engine developing 42 b.hp. at 1,450 r.p.m. The generator operates on the variable-voltage, constant-current principle, with a separately excited shunt field. The exciter is overhung from the rear generator bracket. Power unit, generator, exciter and control are all inclosed in a sheet-metal canopy with removable sides. Heavy-duty, pneumatic-tired wheels and spring-borne running gear parts are attached to the welded channel base. Front wheels are constructed so that they can be steered. This unit, complete, weighs 3,200 lb.



600-Amp. Welder With Electric Drive

Ball Bearing Resists Deflection

A new angular contact double row ball bearing which has been announced by the New Departure Manufacturing Co., Bristol, Conn., is internally preloaded so that an extreme degree of rigidity is attained under radial, thrust or combined loads from any direction. Because of its inherent rigidity, this



Double Row Ball Bearing

bearing can be used alone in sheaves, pulleys and other similar positions formerly requiring the use of two bearings spaced apart to resist deflection, thus greatly simplifying the bearing application and the construction of parts. The new unit is also highly efficient in the support of bevel pinions, worm gearing and other mechanisms requiring accurate and positive location under heavy combined loads. It should have many applications in road building and general construction machinery and equipment.

Brakes Cooled by Special Drum

To overcome heat, one of the most frequent sources of brake trouble in motor truck operation, the Gunite Corp., Rockford, Ill., has developed a brake drum design which assists materially in cooling the entire mechanism of internal expanding brakes. On the internal conical portion of this drum are five fins which fan cool air sucked in through ten small holes. This cool air is blown between the drum and the lining and also over the shoes, aiding materially in reducing the temperature of these component parts. Besides the

Improved Brake Drum

five internal fins, the drum has ten vertical ribs on the outside of the braking surface. These external ribs not only radiate and disperse heat on the outside of the drum but also strengthen the wall section, increase rigidity and prevent distortion.

Boring Machine Places Pipe Under Embankment

For installing pipes or casings up to 24 in. in diameter under railroads, highways and embankments the Young Engine Corp., Canton, Ohio, has developed and placed on the market the Young road-crossing boring machine, which is fundamentally a horizontal rotary drill using the pipe or casing to be installed as a medium for carrying the rotating cutter head. In operation, the machine is placed in a ditch with a 20-30 hp. gasoline power unit set up on the bank at the side. Flexible and adjustable power connections are provided to meet all operating conditions. The casing to be installed is attached to the driving head of the machine, which is an 8x12½-in. forged steel flange on the forward end of a rotating hollow sleeve. This sleeve is forced forward a distance of about 6 ft., rotating power being applied to it by means of a worm gear reduction. The combined rotating and forward thrust of the sleeve forces the pipe with cutter head into the embankment. The sleeve is hollow to permit the removal of dirt broken up on the cutter head, which is removed by means of a spoon attached to a long 1¼-in. pipe handle, or, where conditions are favorable, by water. When the size of the casing is other than 8 in. a suitable swedge nipple is used to reduce or increase the size to fit the flange of the rotating hollow sleeve.

After the sleeve has advanced forward to its full extent, the flange of the driving head is unbolted from the casing and an 8 in. x 5½ ft. pup or extension joint is inserted between the rear end of the pipe and the flange of the driving sleeve, which has been backed to starting position. This cycle of operations is continued, additional extension joints being inserted at each full forward thrust of the rotating sleeve.

Generally, where conditions are favorable, the machine is placed and properly braced at a distance from the face of the embankment equal to the total length of pipe to be installed. This makes it possible to assemble the entire length of pipe at one time. Where the topography of the ground makes this impossible, the pipe or casing is installed in lengths as long as space will permit.

Installing 18-In. Casing Under Railroad

Costs and Contracts

E. N.-R. Index Numbers

Cost		Volume	
Jan. 1, 1931	194.48	December, 1930	192
Dec. 1, 1930	196.86	November, 1930	207
Jan. 1, 1930	208.96	Decermber, 1929	166
Average, 1930	202.85	Average, 1930	260
Average, 1929	207.02	Average, 1929	317
1913	100.00	1913	100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of Jan. 8, with some comparisons, total as follows:

(In Thousands of Dollars)

	Jan. 8, 1931	Average of Last Four Weeks 1930-31	1929-30
Buildings:			
Industrial	$5,816	$3,068	$2,907
Other	26,340	19,539	16,913
Streets and roads..	5,912	4,573	6,154
Other eng. constr..	38,041	21,034	11,502
Total	$76,109	$48,216	$37,477

Total, all classes Jan. 1 to 8:

1931	$104,619
1930	82,332

New Publications

Welding—Accessories and supplies used in welding, including rods, cables, goggles, helmets and gloves, are listed in a 12-page catalog of the FUSION WELDING CORPORATION, 103d St. and Torrence Ave., Chicago, Ill.

Unit Heaters—BUFFALO FORGE Co., Buffalo, N. Y., has issued a 20-p. bulletin on the latest developments in its line of unit heaters. Five different types are described and illustrated.

Air Compressors—Specifications of air-cooled air compressors for trailer, skid and tractor mounting are given in a 14-p. bulletin of the DAVEY COMPRESSOR CO., INC., Kent, Ohio.

Windows—Details regarding pivoted industrial windows and projected windows of the commercial and architectural type are given in two recent bulletins of the CAMPBELL INDUSTRIAL WINDOW CO., INC., Pershing Square Building, New York City.

Steel Plates—An interesting 80-p. book published by the ALAN WOOD STEEL CO., Conshohocken, Pa., contains a description of the company's plants, detailed specifications of floor plates, stair treads, traffic treads and other products, and a discussion of metallurgical control.

Concrete Aggregates—Recent publications of the engineering and research division, NATIONAL SAND & GRAVEL ASSOCIATION, Munsey Building, Washington, D. C., are as follows: Circular 6—"Effect of Soft Particles of Coarse Aggregate on Strength of Concrete," by W. J. Emmons; circular 7, "Effect of Addition of Finer Sizes to Gravel on Strength of Concrete," by Stanton Walker; and circular 8, "Effect of Grading of Gravel and Sand on Voids and Weights," by Stanton Walker.

Business Notes

CHICAGO BRIDGE & IRON WORKS, Chicago, Ill., states that 691 entries have been received in the competition for an improved design for an elevated steel tank. Entries, which closed Dec. 1, were received from sixteen countries.

FORT PITT STEEL CASTING CO., McKeesport, Pa., has appointed Harry S. Ransom manager of sales.

LINDE AIR PRODUCTS CO., New York City, on Jan. 1 took over the marketing of all products of the Union Carbide & Carbon Corp. which are used, in the main, for oxy-acetylene welding and cutting. There has been no change in the distributing stations throughout the country.

HERCULES POWDER CO., Wilmington, Del., has instituted a new division to be called the foreign relations department which will co-ordinate sales and the development of new business in foreign lands. It will be in charge of Peter W. Meyeringh, until recently manager of the N. V. Hercules Powder Co. at Rotterdam, Holland.

C. R. MESSINGER, president of the Chain Belt Co., Milwaukee, has been elected president of the Oliver Farm Equipment Co. Mr. Messinger is also chairman of the board of the Silver Steel Castings Co., vice-president of the Federal Malleable Co., and a director of the Interstate Drop Forge Co. and the Stearns Conveyor Co.

READING IRON CO., Reading, Pa., has appointed F. W. Deppe general manager of sales with offices in New York City. Mr. Deppe was formerly district sales representative at St. Louis, Mo. James K. Aimer has been appointed assistant general manager of sales, in charge of railroad, locomotive and car equipment sales, as well as of bar iron and billet sales.

A. G. SCHOONMAKER & SONS, INC., New York City, has added to its staff Louis M. Vidal, for the past six years general sales manager of the Kelvin Engineering Co., New York. Mr. Vidal will devote his attention to foreign business.

JOHN T. WILKIN, president of the Connersville Blower Co., Connersville, Ind., died on Dec. 27 at the age of 67. Graduated from Rose Polytechnic Institute in 1886, Mr. Wilkin entered the employ of the P. H. & F. M. Roots Co. as a draftsman. A few years later he was instrumental in forming the Connersville Blower Co., being its first chief engineer and later vice-president and president. He was credited with a number of important inventions.

Unit Prices From Current Construction

Evansville Bridge Over the Ohio River

INDIANA state highway commission received bids Oct. 28 and 30 for the four contracts comprising the Ohio River bridge between Evansville, Ind., and Henderson, Ky. Cont. 1 is for the five main piers, and bids cover both stone-faced and concrete designs. Cont. 2 is for the fabricated metal work in the superstructure of the main river bridge, concrete roadway paving, and navigation lights. Cont. 3 is for foundations for the two approaches, and Cont. 4 is for the metal superstructure and concrete paving of the approaches.

The main bridge, consisting of four steel truss spans on concrete piers, is 2,292 ft. 10 in. long, with approach structures 2,038 ft. 6½ in. and 1,063 ft. 9¾ in. in Kentucky and Indiana respectively. Table II summarizes the four contracts. Unit prices are given in Table I for the lowest two or three bidders on each of the contracts: Cont. 1, A, Kansas City Bridge Co., Kansas City (contract); B, Vang Construction Co., Pittsburgh. Cont. 2, A, American Bridge

TABLE I—UNIT PRICES ON FOUR CONTRACTS

Cont. 1—Five River Piers for Main Bridge

	A	B	C	D
18,600 cu.yd. conc. in main piers below tops ftgs. (both designs)	$14.50	$14.50	$19.00	$19.00
11,300 cu.yd. conc. in main pier shafts above tops ftgs. (concrete design)	17.00	.....	12.50	.....
3,000 cu.yd. stone faced masonry above tops ftgs. (stone faced design)	.....	60.50	.....	43.00
8,400 cu.yd. concrete behind stone faced masonry above tops ftgs. (stone faced design)	.....	11.00	.....	9.50
100,000 lb. reinforcing steel in place (concrete design)	.05	.....	.045	.....
3,500 lb. reinforcing steel in place (stone faced design)	.....	.05	.....	.04
Total	$543,775		$562,340	

Cont. 2—Superstructure Main Bridge

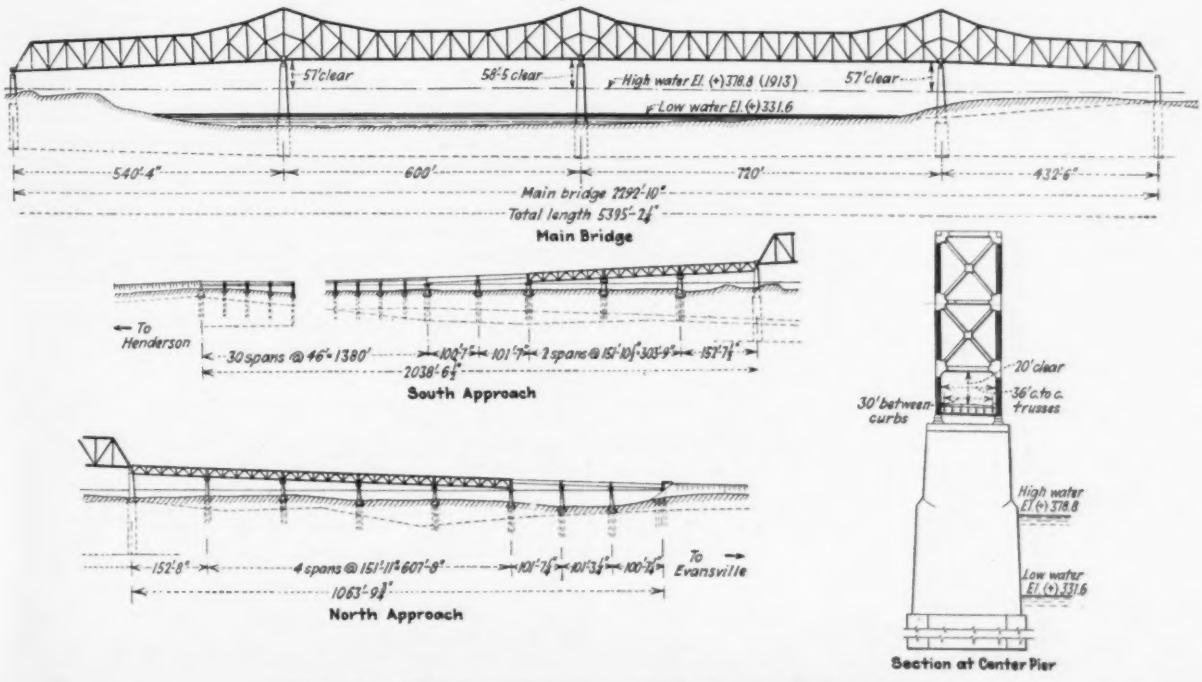
	A	B	C
10,000,000 lb. fabricated metalwork in through cantilever structure piers A to E exclusive of eyebars	$0.0549	$0.061	$0.062
640,000 lb. heat-treated eyebars	.0701	.0775	.08
310,000 lb. carbon steel eyebars	.0501	.059	.06
550,000 lb. roadway reinforcing steel	.05	.04	.036
7,600 sq.yd. concrete roadway paving	5.00	5.10	4.20
10 navigation lights	105.00	185.00	75.00
Total	$675,945	$740,500	$742,270

Cont. 3—Approach Foundations

	A	B	C
42,000 lin.ft. precast conc. piles in place	$2.00	$2.10	$2.50
1,850 cu.yd. conc. in ftgs. of approach piers and abuts.	12.00	12.00	9.50
5,700 cu.yd. conc. in approach pier shafts and abuts. above tops ftgs.	12.00	12.00	11.00
500 sq.yd. waterproofing backs of abutments	.80	.40	.50
150,000 lb. reinforcing steel in place, piers and abuts. (except piles)	.03	.045	.036
Total	$179,500	$185,750	$190,925

Cont. 4—Approach Superstructure

	A	B	C
1,575,000 lb. metalwork, I-beam spans betw. abut. S35 and pier S-5	$0.034	$0.0389	$0.0381
850,000 lb. metal work, deck pl. gird. spans between piers S5 and S3; and N5 and abut. N8	.041	.0447	.0472
2,400,000 lb. metalwork, deck truss sp.'s between pier S3 and pier A; and pier E and pier N5	.04	.0477	.0445
750,000 lb. roadway reinforcing steel	.04	.0370	.0368
10,300 sq.yd. concrete roadway paving	4.50	3.95	5.00
Total	$260,750	$282,178	$286,028



Bridge Over Ohio River Between Evansville, Ind., and Henderson, Ky.

TABLE II—TOTAL BIDS ON EVANSVILLE BRIDGE

Contract	A Bid	A Days	B Bid	B Days	Number Bids	Average All Bids	Engineering Estimate
1. Substructure:							
Stone-faced	$543,775	300	$562,340	300	9	$700,000	$826,975
Concrete	466,800	300	499,150	300	9	610,000	808,300
2. Superstructure	675,945	300	740,500	350	7	753,000	893,660
3. Approach substructure	179,500	300	185,750	180	21	225,000	313,050
4. Approach superstructure	260,750	180	282,178	120	12	305,000	356,575

Co., Pittsburgh (contract); B, Mount Vernon Bridge Co., Mount Vernon, Ohio; C, Wisconsin Bridge & Iron Co., Milwaukee. Cont. 3, A, Rieth-Riley Construction Co., Goshen, Ind. (contract); B, Harold Tharp, Fountain City, Ind.; C, Koss Construction Co., Des Moines. Cont. 4, A, Globe Construction Co., Evansville (contract); B, McClintic-Marshall Co., Pittsburgh; C, St. Louis Structural Steel Co., East St. Louis, Ill.

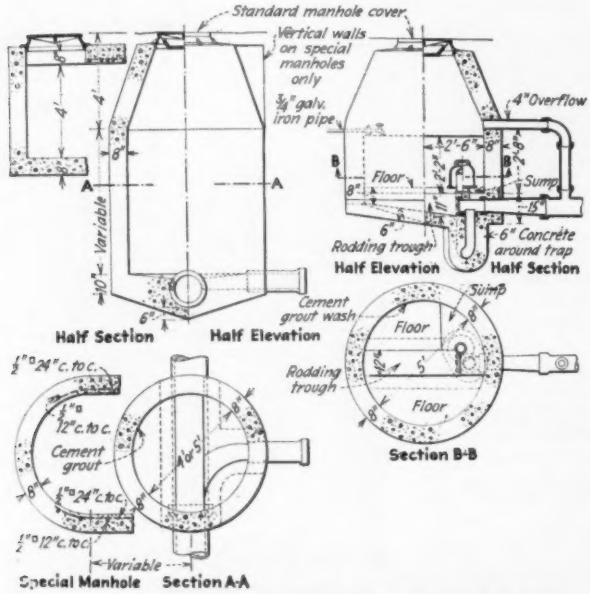
Ralph Modjeski and Frank M. Masters are consulting engineers. Mr. Masters calls attention "to the very low unit prices of the successful bidders on this work; also to the fact that the lowest bidders on the superstructure of the main bridge have plants available for transportation from their fabricating shops to the bridge site on the Ohio River."

Concrete Sewers, Manholes and Flush Tanks, Salt Lake City

A SEWER extension in Salt Lake City, from 21st St. to 30th St. between West Temple and 20th E., consisting of 43,912 lin.ft. 8- to 30-in. concrete pipe, was awarded in November, 1930, for $139,935. Bids were received on both concrete and vitrified pipe. The lowest bidder's prices were the same for either, and contract was placed for concrete on a combination bid submitted by three contractors. Engineer's estimate was $132,750. Complete unit prices are given in the accompanying table.

Work includes construction of 28 manholes and 22 flush tanks, as shown on the drawing. These are of 1:2½:5 concrete. Average bids were $69 for a 4-ft. manhole (sewers under 15-in.), $85 for a 5-ft. manhole, $137.50 for a flush tank.

Bidders were local: A, Christensen-Gardner, Mullins & Wheeler, J. H. Tempest; B, J. L. Griffith; C, Gibbons & Reed Co.; D, Morrison-Knudsen Co. Harry Jessen is city engineer.

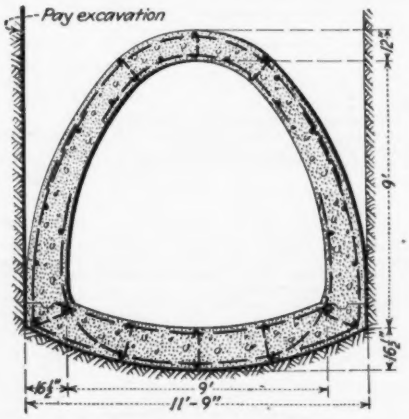


Standard Concrete Manhole and Flush Tank, Salt Lake City

	A	B	C	D
Excav. and backfill, 44,400 cu.yd.	$1.28	$1.45	$1.53	$1.18
Fur. and lay. pipe				
8 in. vit., 22,929 lin.ft.	.57	.70	.545	.81
8 in. conc., 22,929 lin.ft.	.57	.....	.53	.....
10 in. vit., 3,056 lin.ft.	.77	.90	.725	.95
10 in. conc., 3,056 lin.ft.	.77	.....	.70	.....
12 in. vit., 3,259 lin.ft.	1.10	1.20	1.15	1.41
12 in. conc., 3,259 lin.ft.	1.10	.....	1.00	.....
15 in. vit., 5,279 lin.ft.	1.60	1.70	1.65	2.20
15 in. conc., 5,279 lin.ft.	1.60	.....	1.51	.....
21 in. vit., 4,729 lin.ft.	.....	.....	.....	.....
21 in. reinf. conc., 4,729 lin.ft.	3.30	2.90	3.30	3.95
30 in. vit., 4,660 lin.ft.	.....	.....	.....	.....
30 in. reinf. conc., 4,660 lin.ft.	5.00	4.00	4.80	5.95
Construct 4 ft. manholes (85)	65.00	70.00	70.00	70.00
Construct 5 ft. manholes (43)	80.00	80.00	105.00	75.00
Construct flushtanks (22)	130.00	125.00	126.00	169.00
Lumber left in trench, 60 M. ft. B.M.	40.00	60.00	45.00	50.00
Fur. and lay. 12 to 15 in vit. increaser (1)	5.00	5.00	7.00	5.00
Fur. and lay. 15 to 12 in. vit. reducer (1)	5.00	5.00	7.00	5.00
Tear out and replace pavement, 66 sq.yd.	3.00	2.00	3.50	4.00
Tear out and replace macadam surface, 1,320 sq.yd.	1.75	.80	1.75	1.50
Totals using vit. pipe	$139,934	$145,357	$151,567	$154,630
Totals using conc. pipe	139,934		$149,919	

Monolithic Storm Sewer in Tulsa

SECTION 9-H-30 of concrete relief sewer, consisting of 1,607 lin.ft. of 108x108-in. semi-elliptical reinforced-concrete monolithic sewer, runs along the Frisco R.R. from Fourth St. to Guthrie Ave., Tulsa, Okla. The whole section is within the railroad right-of-way and is designed



Cross-Section of Cat Creek Relief Storm Sewer

for locomotive loadings. A cross-section of the sewer is given. Quantities per linear foot are: Concrete in invert, 0.578 cu.yd.; in total section, 1.502 cu.yd.; reinforcing steel, 201.29 lb.; excavation, 0.4015 cu.yd. Seven bids were received, and contract prices are given of the Smedley Construction Co., 2756 East 25th St., which was awarded the contract.

1,607 lin.ft. 108 in. x 108 in. semi-elliptical reinf. mono. conc. sewer, exclusive reinf. steel	$18.70
324,500 lb. reinf. steel, in place	.025
6,450 cu.yd. earth excav.	1.00
2,150 cu.yd. loose rock excav.	1.00
3,050 cu.yd. solid rock excav.	3.00
4 std. manholes, 6 ft. deep	55.00
35 additional ft. of manhole	5.00
1 manhole removed	10.00
1 sanitary sewer crossing	65.00
10 lin.ft. 12 in. sewer pipe	.85
4 lin.ft. 15 in. sewer pipe	1.00
4 lin.ft. 24 in. sewer pipe	2.10
4 lin.ft. 30 in. sewer pipe	3.50
40 lin.ft. 36 in. precast reinf. conc. pipe	4.90
2 sewer connections, (36 in. cut-overs to existing Cat Creek sewer) complete	50.00
2 cu.yd. extra concrete, 1:2:4	14.00
110 sq.yd. paving removed	.40
110 sq.yd. class "A" paving using quick-set cement	4.00
950 lb. reinf. steel for pavement	.03
25 lin.ft. curb removed and replaced	.85
Total contract price	$57,841

CONSTRUCTION NEWS

Some of the Week's Large Projects

Location	*Project*	*Cost*	*Status*
Sewers			
East Chicago (Ind.)	Sewage disposal plant	$1,000,000	Proposed
Bridges			
Cleveland	Bridge super-structure	1,660,107	Contract
Power and Lighting			
Brooklyn	Distribution system, etc	9,094,000	Day labor and separate contracts
Subways			
Brooklyn	Subway	4,970,184	Contract
Long Island City	Subway	6,296,235	Contract
Unclassified			
New Orleans	Sprinkler system	1,250,000	Contract
Texas	Gas pipe line	3,000,000	Day labor
Utah and Idaho	Gas pipe line	3,200,000	Day labor
Canada	Telephone improvements	20,000,000	Proposed
Federal Government			
New London	Academy	1,818,000	Contract
Factories and Mills			
Pekin (Ill.)	Sugar plant	1,000,000	Proposed
Old Bridge (N. J.)	Yeast plant	2,000,000	Contract
Power Plants			
Edson (Alta.)	Power development	5,000,000	Proposed
Warehouses			
New York	Freight terminal	9,000,000	Bids asked
Buildings			
New York	Apartment	5,000,000	Bids asked
New York	Club	8,000,000	Proposed
New York	Y. M. C. A.	2,000,000	Bids asked
New York	Hospital	1,000,000	Proposed
New York	Hospital	1,550,000	Bids asked
New York	Hospital	3,000,000	Bids asked
New York	Nurses home, etc	1,000,000	Bids asked
New York	Office	2,000,000	Bids asked
Dayton (O.)	Office	1,000,000	Contract
Baltimore	Library	2,044,000	Contract
Jamaica (N. Y.)	Armory	1,500,000	Bids asked
New York	Armory	1,000,000	Bids asked
New York	Dept. health office	4,000,000	Bids asked
New York	Police headquarters	8,000,000	Proposed
Ohio	Penitentiary, etc	3,060,000	Proposed
Cleveland	Institutional	1,650,000	Proposed
Cleveland	Public hall	1,500,000	Proposed
Roxbury (Mass.)	School	1,500,000	Bids asked
Brooklyn	High school	2,500,000	Proposed
New York	University	5,000,000	Proposed
Cleveland	High school	1,000,000	Bids asked
Hackensack (N. J.)	Theatre	1,000,000	Bids asked
Indianapolis	Mausoleum	1,800,000	Contract
New Orleans	Railroad stations, etc	11,300,000	Proposed

WATERWORKS

PROPOSED WORK

Calif., Fullerton—For 11,000 ft. pipe line in East Wilshire and East Commonwealth Aves. $15,000. C. M. Thorpe, city engr.

Calif., Los Angeles—Los Angeles Co. Flood Control Dist., 3 dams in San Gabriel Canyon, incl. check dams, spreading grounds, other appurtenant works (in project designed to supplant San Gabriel High Dam which the state rejected). E. C. Eaton, ch. engr. dist.

Calif., San Bernardino—San Bernardino Co. Water Works Dist. 9, water system extensions, pumping plants, filter system. $50,000.

Calif., Vallejo—For 14-and 24-in. mains connecting with Fleming reservoirs. $75,000. T. D. Kilkenny, city engr.

Ind., Delphi — Replacing mains. $18,000. Address City Clerk.

Ind., Evansville — Preliminary plans waterworks, filtration system. $100,000. Black & Veatch, Mutual Bldg., Kansas City, Mo., engrs.

Ind., Kentland—Improving municipal water plant. $100,000.

Ind., Huntington — City Council, relaying mains. $15,000. T. Annon, Huntington, city councilman.

Kan., Eldorado — Soon takes bids filtration plant. $70,000. F. E. Schide, Eldorado, engr.

Ky., Morganville — City Council, waterworks improvements. To exceed $15,000. Black & Veatch, 700 Mutual Bldg., Kansas City, Mo., engrs.

Mass., Plymouth — Town, waterworks, Manomet Dist. To exceed $15,000.

Mass., Yarmouth — Town, pumping station, watermains, hydrants, etc. $75,00. Engineer not selected.

N. J., New Brunswick—East Brunswick Twp., F. Smith, clk., mains in Brunswick Turnpike, South River and Old Bridge Rd., Davison and Icker Aves., Prigmore, Marietta and Arthur Sts. $40,000.

N. D., Fargo—Filtration plant addition to increase capacity 6 m.g.d. To exceed $15,000. W. P. Tarbell, city engr.

O., Cleveland — Bd. Comrs. Cuyahoga Co., waterworks, incl. 13,000 ft. 12- to 16-in. c.i. pipe. Impvt. 199 in Parma. $80,000. W. J. Rogers, Ulmer Bldg., Cleveland, engr.

O., Cleveland—Preliminary plans high service reservoir, incl. pumping station, filtration building, gate house and chemical building, Wooster Rd. $600,000. L. A. Quayle, City Hall, engr.

O., Mechanicsburg—Private Interests, developing waterworks, incl. mains, pumping station and accessory plant. $65,000. Village Council granted franchise to T. B. Ware, atty., which provides after certain length of time the plant may be acquired by village.

O., Wickliffe—Village bids in summer, watermains. $75,000. Sterling Eng. Co., 7016 Euclid Ave., Cleveland, engrs.

Okla., Burlington—Preliminary plans waterworks. $18,000. C. H. Guernsey, Cherokee, engr.

S. D., Brookings—City, A. O. Bortnem, and., water softener at municipal waterworks. $25,000. Nixon & Reynolds, 503 Grain Exch. Bldg., Omaha, Neb., engrs.

Tex., Corpus Christi—Colonial Beach Club, c/o R. L. Hairoll, and L. Lusk, Corpus Christi, complete waterworks, incl. distributing main lines, laterals, pumping unit, on resort site at junction of Padre and Mustang Islands, near here, to connect with club buildings and cottage inns; also sanitary sewerage system, mains, laterals, probably septic disposal plant; power system, incl. lighting system with dynamo unit, etc.; 2 story clubhouse, with 2 wings, 36 rooms each and 36 cottages. Owners may purchase materials and equipment and build by own forces.

Tex., Taylor—City waterworks improvements, incl. rein.-con. reservoir, 75 ft. high, $125,000. Address City Engineering Dpt.

Tex., Yoakum—Bids in February, waterworks, incl. large pumping unit, distributing system, large mains, probably reservoir. $250,000. Montgomery & Ward, 544 Harvey-Snider Bldg., Wichita Falls, engrs. Noted Dec. 25.

Wash., La Conner—City bids about Feb. 11, water supply to connect with Anacortes watermain, constructing 200,000 gal. reservoir. $40,000. W. C. Morse, Inc., Smith Tower, Seattle, engr. Noted Dec. 18.

N. B., St. John—City, waterworks addition. $20,000.

N. S., Reserve Mines—Municipality of Cape Breton Co., waterworks. $76,000.

BIDS ASKED

Calif., Beverly Hills—Jan. 27, by City Council, furnishing, installing certain booster pump equipment, deep well turbine pump, drilling well, constructing underground pump chamber. Salisbury, Bradshaw & Taylor, 714 West 10th St., Los Angeles, engrs.

Mich., Detroit—Jan. 20, by Bd. Water Comrs., 735 Randolph St., 6 traveling water screens for new screen chamber. Waterworks Park. Contr. RC-15. G. H. Fenkell, genl. mgr. and ch. engr.; adv. E. N.-R. Jan. 8.

Minn., Crosby—Jan. 13, by Village, furnishing, installing deep well turbine pump, with electric motor for 12 in. well, 225 g.p.m. against head of 175 ft. through 10 in. pipe. P. J. Sheets, ch. engr.

Minn., Monterey—Jan. 27, by Village, waterworks, incl. 5,000 lin.ft. c.i. mains, elevated tank, pump house, pumping machinery fire hydrants, well. $20,000. W. E. Buell & Co., 337 Insurance Exch. Bldg., Sioux City, Ia., engrs.

Mo., St. Louis—See "Contracts Awarded."

N. D., Grand Forks—Jan. 14, by Bd. City Comrs., low lift concrete pump house, 2,445 lin.ft. 18 in. c.i. mains, 700 lin.ft. concrete box and 300 lin.ft. 18 in. steel pipe in East Grand Forks. $40,000.

O., Barberton—Feb. 1, by Bd. Control, extending mains to Johnson Corners Dist., incl. mains in 30 streets. $40,000.

O., Cleveland—Jan. 16, by City, furnishing c.i. pipe, special castings, disc water meters. R. Hoffman, City Hall, engr.

Okla., Lawton—Jan. 13, by T. Sanders, city clk., 65,000 ft. 24 in. c.i. or steel pipe flow line from city to City Lake. $250,000. F. E. Lawrence, Lawton, engr.

Ont., Hamilton — Jan. 21, by City Clerk, rapid sand filter units, chemical feed equipment in connection with filtration plant. Noted Feb. 13.

CONTRACTS AWARDED

Calif., Irvine—Irvine Co., earth fill dam in Peters Canyon, to H. W. Rohl Co., 4351 Alhambra Ave., Los Angeles, $55,000.

Calif., Redwood City—City Council, furnishing 6,000 ft. 8 in. and 3,000 ft. 6 in. c.i. water pipe, to United States Pipe & Fdry. Co., Monadnock Bldg., San Francisco, $6,685. Noted Dec. 18.

Conn., Hartford—City, Bd. Contr. & Supply, pumping station equipment for South Meadows Storm Water Pumping Station, to Starkweather & Broadhurst, Inc., 79 Milk St., Boston, Mass., $72,000. Est. $75,000.

Ill., Chicago—Bd. Local Impvts., City Hall, c.i. water supply pipes, necessary castings, c.i. fire hydrants, c.i. valves, brick valve basins in Marquette and North Newcastle Aves., to M. J. Bohan, 1105 West Garfield Blvd.; Nelson St. and North Cicero Ave., to J. J. Callahan, 3139 Indiana Ave.; East 98th Pl., West 97th, East 98th and South La Salle Sts., Harvard, Princeton, Yale, Perry and Fayette Aves., to S. Ryan, 2927 West Congress St. Noted Dec. 11.

Ind., Bedford — Pumping station addition, roller bearing trolley, metal lathe, exhaust fan, steel doors and joists, to Heitger & Garriott, Bedford. Est. $15,000. Noted July 31.

Kan., Johnson City—Waterworks, to C. L. Burt, Hutchinson, $27,823.

Mass., Fall River—City, steel tank, Emmett St., to Pittsburg Des Moines Steel Co., 250 Church St., New York, $14,200; foundation, to Montaup Sand & Gravel Co., Swansea, $3,403. Est. $20,000. Noted Dec. 18.

See proposal advertising on page 79

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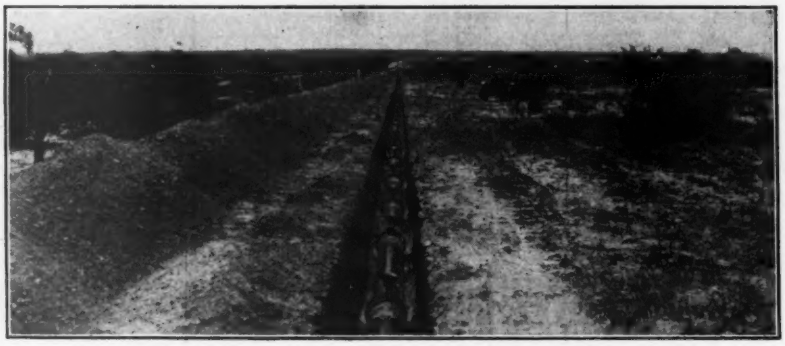
LEADITE

Trade Mark Registered U.S. Pat. Office

Bell and spigot water pipe lines are usually permanent jobs,...and their joints should be considered the same.

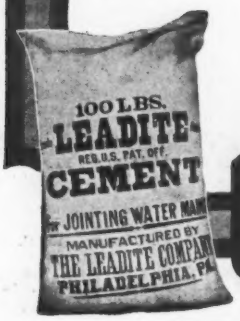


A 16" c. i. bell and spigot water main, laid with LEADITE Joints.

The prominence and prestige attained by LEADITE among water works men, most everywhere, stand out as a great achievement in the method of making joints in bell and spigot water pipe lines.

The pioneer self-caulking material for c. i. pipe.
Tested and used for over 30 years.
Saves at least 75%

THE LEADITE COMPANY
Land Title Building - - Philadelphia, Pa.



No Caulking

Waterworks (Continued)

Mass., Newton—City, altering water supply, incl. surface drains, building, Watertown St. and Jackson Rd., to D'Amore Constr. Co., 89 State St., Boston, $25,400. Noted Dec. 18.

Mich., River Rouge—Village, furnishing, installing motor-driven centrifugal pumping equipment for water pumping station extension, to Power Plant Supply Co., 730 Fisher Bldg., Detroit, $15,000.

Mo., St. Louis—City Water Dpt., L. Day, comr., 2 mi. 36 in. mains south from Manchester to Sulpher Aves. to Hampton Ave. and south to Nottingham Ave., day labor. $200,000.

N. J., Lodi—Bd. Boro Comrs., Boro Hall, water equipment, pipe, valves, boxes, caulking lead, to Neyland Plumbing Supply Co., 161 Quincy St., Passaic. Est. $5,000. Noted Dec. 10 Daily.

N. J., Newton—Town Comn., Town Hall, 115 Spring St., elevated steel tank for water storage at town reservoir, to Chicago Bridge & Iron Wks., 30 Church St., New York. Est. $18,000. Noted Oct. 9.

N. Y., New York—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains in Prospect Ave., to J. V. Timoney Constr. Co., 256 Bway., $33,960. Noted Dec. 18.

Pa., Franklin — City Council, two 1 m.g. tanks, to Petroleum Iron Wks., Sharon, $17,000. Noted Dec. 4.

Wash., Olympia — City Council, furnishing 19,484 ft. various sized watermain used in improving municipal water system, to American Cast Iron Pipe Co., Smith Tower, Seattle, $25,494.

Wash., Seattle—City Council, mains in Beacon Ave., et al, to Argentieri & Colorossi, 1819 Weller St., $43,126.

Wis., Milwaukee—Dpt. P. Wks., furnishing, laying mains in North Richards St., to John Brogan & Son, 264 Prospect Ave., $18,897.

Ont., Niagara Falls — Bd. Water Comrs., W. A. McDowell, secy., furnishing, installing switching equipment at pumping station, to Canadian Westinghouse Co., Hamilton. $38,000; 10 filters, to Roberts Filter Co., 11 King St., West Toronto, $90,000. Noted Dec. 4.

Que., Lachine—City Council, water pipe in connection with filtration plant, to Canada Iron Foundries Ltd., 28 Victoria Sq., $40,477. Noted Nov. 20.

Ont., Ottawa—City, N. H. H. Lett, clk., City Hall, superstructure water purification plant at Lemieux Island, to Ross-Meagher Ltd., Elgin St., $286,500. Noted Dec. 11.

SEWERS

PROPOSED WORK

Ark., Dumas—Soon takes bids 33,290 ft. 6 in., 5,073 ft. 8 in. and 3,000 ft. 15 in. sewers, 4,020 ft. 15 in. and 1,130 ft. 18 in. storm drains, two 2 unit lifting stations, sewage disposal plant, incl. Imhoff tank with accessories, in Sewer Impvt. Dist. 1. $60,000. F. R. Allen, Pine Bluff, engr.

Calif., La Habra — Sewage disposal plant. $25,000 or more. J. G. Sanks, city engr.

Calif., Long Beach—Connecting North Beach, Signal Hill, Los Cerritos and California Heights sections with city outfall sewer at harbor. To exceed $25,000. H. Paterson, city engr.

Calif., Modesto—Extending sewers. $55,000. F. J. Rossi, city engr.

Calif., Riverside—Sewage disposal system. To exceed $25,000.

Calif., Santa Ana—See "Grade Crossings."

Fla., Winter Haven—Extending sewers, constructing disposal plant.

Idaho, Idaho Falls—City, 10 blocks 36 in. sewer. $50,000. C. R. Black, city engr.

Ill., Woodriver — Probably take bids soon complete relief sewerage system. $400,000. Sheppard, Morgan & Schwaab, Faulstich Bldg., Alton, and Bank of Edwardsville Bldg., Edwardsville, engrs.

Ind., East Chicago—Bd. P. Wks., sewage disposal plant. $1,000,000. Z. B. Campbell, East Chicago, engr.

Ind., Kokomo—Sanitary sewers. $25,000. G. Mix, Kokomo, engr.

Ind., Richmond — City municipal electric plant, improvements, extensions. $101,500. D. B. Davis, Richmond, engr.

Mass., Barnstable — Town sewage disposal plant and sewerage system in Hyannis. $250,000. Whitman & Howard, 89 Broad St., Boston, engrs. Noted Jan. 23, under "Hyannis."

Mass., Stoughton — City, sewerage system (gravity). $25,000 or more.

N. J., Plainfield—Bd. Freeholders Union Co., Court House, Elizabeth, conduits carrying Cedar Brook, across Arlington, Park, Prospect and Watchung Aves. $25,000 or more. R. Collins, Elizabeth, co. engr.

N. Y., Rome — Bd. Estimate & Contr. soon takes bids furnishing, installing machinery for sewage disposal plant. $30,000. H. W. Taylor, 11 Park Pl., New York, consult. engr. Noted Nov. 27.

O., Hudson—Village, bids in spring, sewers in 4 streets. $50,000. C. W. Courtney, 1771 East 11th St., Cleveland, engr.

O., Northfield—Village, bids in spring, sewer and water mains. $75,000. C. W. Courtney, 1771 East 11th St., Cleveland, engr.

O., Wickliffe—Village bids in spring, sewers, $125,000. Sterling Eng. Co., 7016 Euclid Ave., Cleveland, engrs.

Okla., Pauls Valley—Preliminary plans sanitary sewer extensions in Pear, Pecan, Cherry and Vine Sts. $27,000. H. Harris, Pauls Valley, engr.

Okla., Wewoka—Preliminary plans new east side sewage disposal plant. $40,000. J. B. Howard, Wewoka, engr.

S. D., Watertown — Bids in spring, sewage disposal plant. $225,000. W. F. Cochrane, city engr.

Ont., Collingwood—Council expending $50,000, sewer extensions, constructing roads, ditching, to aid unemployed. W. H. Whipps, town clk.

Que., Three Rivers—Soon takes bids sewers. $124,000.

BIDS ASKED

Calif., Los Angeles—Jan. 14, by Los Angeles Co. Sanitation Dist. 2, 2 sludge digestion units, each incl. 4 sludge digestion tanks, pump, boiler house, gas tank, appurtenant structures.

Md., Cambridge—Jan. 13, by Bd. Comrs., 15,310 lin.ft. 6- to 24-in. sewers, 40 manholes from 5 to 15 ft. in depth. G. L. Bryan, Jr., city engr.

Mich., Flint—Jan. 15, by City Clerk, constructing 2nd filter unit, incl. aeration tank, blower building, trickling filters, final settling tanks, chlorination building, piping, drainage, for unit of sewage treatment works, Contr. S.D. 6. $643,000. Hoad, Decker, Shoecraft & Drury, Ann Arbor, engrs.

N. Y., Brooklyn—Jan. 14, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewers in Avenue P, Madison Pl., Quentin Rd., East 36th, East 35th, East 32nd, East 31st, East 36th, East 35th Sts.

N. Y., New York—See "Streets and Roads."

N. Y., Plattsburg—Jan. 20, by Dpt. Educ., Education Bldg., Albany, sewers, water lines at Plattsburg State Normal School; adv. E. N.-R. Jan. 8.

O., Cleveland—Jan. 14, by City, sewers in Canal Rd. from Columbus Rd. to point 1,000 ft. easterly, and Walworth Run Diversion Sewer connection. $50,000. R. Hoffman, City Hall, engr.

Tex., Irving—Jan. 13, by City, c/o J. Haley, sewerage system, sewage treatment plant. $25,000. Koch & Fowler, Central Bank Bldg., Dallas, engrs.

Wis., Milwaukee — Jan. 16, by Sewerage Comn., 1 story, 38 x 62 ft. and 18 x 21 ft., brick, steel, rein.-con. return sludge pump house, pipe tunnel at sewage disposal plant, Jones Island. $50,000. J. F. Ferebee, Milwaukee, ch. engr.

CONTRACTS AWARDED

Conn., Middletown — Durant Sewer, to S. Mazzotta, Mazzotta Pl., $25,818. Est. $50,000-$60,000. Noted Dec. 11.

Ky., Louisville—Bd. Sewerage Comrs., M. H. Crawford, chn., 400 Marion E. Taylor Bldg., 4th and Jefferson Sts., Montana Avenue Sewer Sect. A, Contr. 52, incl. 3,500 lin.ft. 6 ft. 6 in. x 9 ft. 9 in. rein.-con. inverted egg sewer, to J. J. Quinn Co., 2425 Lexington Rd., $115,321. Noted Oct. 30.

La., Baton Rouge—Comn. Council, 22 mi. 8- to 30-in. sanitary sewers, up to 26 ft. deep, to G. J. Robinson Co., Pine Bluff, Ark., $191,359. Noted Dec. 11.

Mass., Boston — Metropolitan Dist. Comn., 5,200 ft. Sect. 116 New Neponset Valley Sewer, South Metropolitan System in Canton and Norwood, to A. D. Daddario, 15 Agnes Ave., Hyde Park, $71,770. Noted Dec. 11.

Mass., Newton—For 2,700 ft. 6 x 7 ft. rein.-con. culvert from Border to Rowe Sts., to John MacDonald Constr. Co., 250 Stuart St., Boston, $42,126. Est. $45,000.

N. J., Millburn—Millburn Twp. Com., Town Hall, storm sewer in Short Hills and Brantwood Sect., to J. J. Holden, Inc., Lyndhurst, $64,777. Noted Jan. 1.

N. J., Newton—Town Com., A. G. Vought, clk., extending Sparta and Clinton Street Sewage Treatment Works Sect. 1, to Merritt Chapman & Scott Corp., 17 Battery Pl., New York, $89,800; Sect. 2, to Hitchings & Co., 701 Spring St., Elizabeth, $8,904; Sect. 3, to Gray Constr. Co., Franklin St., Morristown, $3,200. Grand total $101,904. Noted Dec. 25.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, storm sewers in Voorhies Ave. and 68th St., to P. Tomassetti Contg. Co., 1074 60th St., $16,660 and $3,632 respectively; West 6th St., to M. Fornara, 216 1st Ave., $5,074; repairing basin culvert, to Manmill Constr. Co., 1780 Pitkin Ave., $11,271; furnishing manhole heads, covers, to Campbell Fdry. Co., foot Worthington Ave., Harrison, N. J., $3,074. Grand total $39,711. Noted Dec. 4.

N. Y., New York—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., sewer in Adams Pl., to A. Caserta, 2442 Barnes Ave., $1,146; Jerome Ave., to Anita Constr. Co., 410 200th St., $8,681. Noted Dec. 18 under "Streets and Roads."

Okla., Tulsa — Bd. City Comrs., Bren-Rose Storm Sewer, and 48 in. sewer in Yorktown Ave., Storm Sewer Project 16-30, to J. H. Maxwell, 5 North Boston St., $25,789. Est. $36,398.

Pa., Phila.—Dpt. P. Wks., Bureau Eng. & Surveys, City Hall Annex, A. Murdock, dir., to J. McCool, 7247 Ogontz Ave., branch sewers in Ashdale St. from Front to Mascher Sts. $4,004, 19th St. from Locust to Rittenhouse Sts. $2,886; to E. DiSandro, 609 Rising Sun Ave., Ashdale St. from Mascher St. to west of railroad $2,120; to Campellone & Diorio, 3866 North 10th St., Belgrade St. from Orthodox to Lefevre Sts., Wilmot St. from Livingston to Belgrade Sts. and Wilmot St. from Belgrade to Frankford Creek $14,336; to Mundy Paving & Constr. Co., 226 South Warnock St., Callowhill St. from Rhodes to Malvern Sts. $4,723; to A. J. Sandro & Son, 6400 North 5th St., Champlost St. from 9th to Hutchinson Sts. $3,155; to D. Sipio & Vallone, 28th and Wolf Sts., Elmwood Ave. from 70th to 77th Sts. $9,677; to R. DiVito, 6314 Dicks Ave., 4th St. from Girard to Thompson Sts. $4,682, Longshore St. from Loretto Ave. to Frontenac St. $5,938, Pickering St. from Mt. Pleasant to Mt. Airy Sts. $8,864; to A. Frunzi, 513 High St., Lawndale St. from Devereaux to Levick Sts. $1,357; to Leva Bros., 104 West Gale St., Levick St. from Hawthorne to Battersby Sts. $2,559, Tyson Ave. from Castor St. to Loretto Ave. $3,986; to Western Constr. Co., 2234 South 12th St., Loretto Ave. from Magee to Glenview Sts. $5,341; to J. J. McHugh, 1617 Race St., Pechin St. from Seville to Hermit Sts. $5,374; to P. and A. J. Ellis, 4th and Montgomery Sts., 7th St. from Parish St. to Girard Ave. $23,440. Grand total $102,452.

Pa., Pittsburgh—See "Streets and Roads."

Tex., Harlingen—City, c/o S. Botts, sanitary sewer improvements, to Nutter & Taliaferro, Harlingen; storm sewers, to L. G. Nichols, 314 East Washington St.

Wis., Milwaukee—Sewerage Comn., furnishing, fabricating and delivering conveyor system in extension to Dryer House, to Lippmann Eng. Co., 40th and Mitchell Sts., $46,300. Noted Dec. 11.

Ont., Ottawa—Secretary Bd. Control, King Edward Relief Sewer, incl. supplying, placing 2,430 ft. concrete pipe in tunnel, to McDougall Bros., Ottawa, $122,823. Noted Oct. 2.

WASTE DISPOSAL

BIDS ASKED

N. Y., Bay Shore—Jan. 28, by Town of Islip, 60 ton garbage incinerator, appurtenances. R. J. Bartley, Bay Shore, town engr.

Ont., Hamilton—Jan. 21, by F. H. Kent, city clk., furnishing, installing two 125 ton furnaces for new incinerators.

BRIDGES

PROPOSED WORK

Ariz., Tucson—Bd. Supervs. Pima Co., rejected bids 184 ft. timber pile trestle bridge over Santa Cruz River. J. R. Hubbard, co. engr.

Ind., Evansville—Bd. Comrs. Vanderburgh Co. did not open bids Dec. 16, bridge over Pigeon Creek at West Franklin St. $175,000. S. B. Bell, Evansville, co. aud. Noted Dec. 11.

O., Urichsville—Tuscawaras Co. (New Philadelphia). City and State, bridge over Pennsylvania R.R., Water St. $128,000.

Tenn., Nashville—City and Nashville, Chattanooga & St. Louis R.R. Co., Nashville, H. McDonald, ch. engr., new and longer bridge over tracks at 8th Aves. $83,347.

Texas—Hy. Comn., W. R. Ely, chn., Austin, steel, concrete, timber bridge over Navasota River, Hy. 21, Federal Aid Project 582-D, Robertson and Leon Counties. $75,000. G. G. Wickline, Austin, bridge engr.

Texas—Hy. Comn., W. R. Ely, chn., Austin, steel, concrete bridge over Navasota River, on Hy. 21, Brazos and Madison Counties. $90,000. G. G. Wickline, Austin, bridge engr.

Tex., Fort Worth—Tarrant Co., c/o W. E. Yancey, aud., steel, rein.-con. bridge over Clear Fork of Trinity River on T.C.U. and Foundry Rd. D. A. Davis, Fort Worth, co. engr.

Tex., Waxahachie—Hy. Comn., W. R. Ely, chn., Austin, soon takes bids 0.314 mi. steel, concrete viaduct over Missouri, Kansas & Texas R.R. and Trinity & Brazos Valley R.R. tracks on Hy. 6, Ellis Co. G. G. Wickline, Austin, bridge engr.

Man., Lac du Bonnet—Town Council soon takes bids bridge over Winnipeg River. $249,000.

Man., Winnipeg—City Council soon takes bids bridge over Red River, Main St., $600,000; also bridge over Arsinilone River, $480,000.

BIDS ASKED

Alabama—Jan. 14, by State Hy. Dpt., Montgomery (**F.A.P. means Federal Aid Project**), concrete bridges on hys. between Talladega and Sylacauga, F.A.P. 218, Talladega Co., $60,000—overhead bridge in Greenville and concrete paving 4,900 sq.yd. hy. F.A.P. 223, Butler Co.—concrete bridge over Cedar Creek, 3½ mi. south of Hartselle, F.A.P. 983, reopened, Morgan Co.

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Bridges (Continued)

—steel, concrete bridge over Conecuh River, F.A.P. 219, Pike Co. — concrete bridge over Chehow Creek, F.A.P. 62A, Talladega Co. — steel, concrete bridge over Old Town Creek, at Benton, F.A.P. 220, Dallas and Lowndes Counties. W. Finnell, hy. dir.

California — Jan. 28, by State Hy. Comn., Sacramento, widening bridge over Topanga Creek 4 mi. north of Santa Monica, incl. eight 27 ft. timber spans on pile bents adjoining existing concrete bridge, grading, asphaltic concrete surfacing approaches; widening bridge over Las Flores Creek, 7 mi. north of Santa Monica, incl. two 26 ft. rein.-con. girder spans on concrete pier, abutments, grading, asphaltic concrete surfacing approaches, both Los Angeles Co. C. H. Purcell, ch. hy. engr.

Ind., Michigan City—Jan. 14, by Bd. Comrs. Laporte Co., Laporte, 150 ft. span double leaf bascule bridge, 36 ft. roadway, two 8 ft. sidewalks, at Franklin St. $300,000. Scherzer Rolling Lift Bridge Co., 53 West Jackson Blvd., Chicago, Ill., engrs. Noted Nov. 27.

Maryland — Jan. 20, by State Roads Comn., Baltimore, G. C. Uhl, chn., steel, concrete bridge over Baltimore & Ohio R.R., at Frederick Junction, Contr. F-158-53, Frederick Co. L. H. Steuart, secy.; adv. E. N.-R. Jan. 8.

Texas—State Hy. Comn., W. R. Ely, chn., Austin, bids soon to close Jan. 19 or 20, 16 span, 839 ft. steel, concrete bridge over Brazos River, Hy. 67, State Aid Project 694-B, Young Co. G. G. Wickline, Austin, bridge engr.

Texas—State Hy. Comn., W. R. Ely, chn., Austin, takes bids soon to close Jan. 19 or 20, 285 ft. and 171 ft. concrete girder bridges, on Hy. 28, Federal Aid Project 568-E, Upton Co. P. H. Caldwell, Rankin, resident engr.

Texas—Brown Co. (Brownwood) and San Saba Co. (San Saba), taking bids 160 ft. steel, rein.-con., timber hy. bridge, 24 ft. over Colorado River, south of Indian Creek on south line of Brown Co. $125,000.

CONTRACTS AWARDED

Calif., Santa Rosa—Bd. Directors Joint Hy. Dist. 16, Sonoma Co., 900 ft. bridge, incl. two 145 ft. steel deck truss spans, nine 60 ft. steel girder spans with concrete decks, steel beams, piling, one 30 ft., one 40 ft. rein.-con. abutments over Russian River, near Jenner, to Rocca & Coletti, San Rafael, $173,255. Noted Dec. 18.

Kansas—State Hy. Comn., Topeka, ten 30 ft. span concrete bridge in Comanche Co., to Bateman Constr. Co., Little Rock, Ark., $32,612.

Kansas — State Hy. Dpt., at Court House, Lawrence, two 160 ft. span bridge in Douglas Co., to Jensen Constr. Co., Kimballton, Ia., $58,387.

New Jersey — State Hy. Comn., Trenton, single leaf, simple trunnion bascule span bridge with short creosoted timber trestles, approaches across Delaware & Raritan Canal, Route 26, Sects. 1 and 2, Bakers Basin, Mercer Co., to S. S. Thompson & Co., 177 Monmouth St., Red Bank, $136,296. Noted Dec. 11.

New Jersey—Bd. Freeholders Cape May Co., Cape May Court House, complete creosoted timber trestle on highway connecting Cape May Court House and Stone Harbor, to D. S. Bader Constr. Co., Virginia St., Atlantic City, $179,954. Noted Dec. 26.

O., Cleveland — Cuyahoga Co., decks, approaches, for Lorain-Central Bridge, to Lowensohn Constr. Co., Newman-Stern Bldg., Class "H" concrete and sandstone $1,660,107. Noted Dec. 4.

Va., Richmond—Bd. Aldermen repairing 9th St. Bridge, to Richmond Structural Steel Co., 17th and Dock Sts. Est. $50,000. Noted Dec. 11.

Wisconsin—State Hy. and Fond du Lac Co. Hy. Comns., Milwaukee, Van Dyne Overhead Bridge, S. P. 2844, to C. R. Meyer & Sons, Oshkosh. $30,698.

Ont., Chatham—W. G. McGeorge, city engr., Bank of Commerce Bldg., superstructure double leaf underneath counter weight bascule bridge, plate girder type, 5th St., to Canadian Bridge Co., Walkerville, $96,000. Noted Dec. 4.

STREETS AND ROADS

BIDS ASKED

Alabama—Jan. 14, by State Hy. Dpt., Montgomery, **(F.A.P. means Federal Aid Project)**, concrete or bituminous concrete on concrete base paving 10 mi. F.A.P. 222, St. Clair and Talladega Counties—16 mi. F.A.P. 200, Calhoun and Talladega Counties—14 mi. F.A.P. 188C, Sumpter Co.—11 mi. F.A.P. 189A, Escambia Co.—5 mi. F.A.P. 192, DeKalb Co.—21 mi. F.A.P. 170, Houston Co.—18 mi. F.A.P. 193A-221, Baldwin Co.—22 mi. F.A.P. 196, Colbert Co.—3½ mi. F.A.P. 151, Cullman Co.—all foregoing 18 ft. wide—4 mi. F.A.P. 155, revised, Montgomery Co.—16 mi. F.A.P. 224, Etowah Co.—16 mi. F.A.P. 216, Montgomery Co., 20 ft. —concrete, bituminous on concrete surfacing 22 mi. F.A.P. 171, Limestone and Madison Counties—13 mi. hy. between Argo and Huffman, Jefferson Co.—14 mi. F.A.P. 169, Dallas Co.—12 mi. hy. between Hamilton and Guin, Marion Co.—13 mi. F.A.P. 188-B, Marengo Co., all foregoing 18 ft. W. Finnell, hy. dir.

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California—Jan. 21, by State Hy. Comn., Sacramento, grading, asphaltic concrete paving 6.3 mi. road between Trifolium Canal and Kane Springs Imperial Co. C. H. Purcell, P. Wks. Bldg., Sacramento, hy. engr.

Calif., Culver City—Jan. 19, by City Council, grading, 2 in. warrenite on 6 in. asphaltic concrete paving 471,000 sq.ft., 2 in. warrenite on 6 in. concrete paving 428,000 sq.ft. A. and I. 8, Sepulveda Blvd.

Calif., Los Angeles—Bd. P. Wks., City Hall, taking bids and open same Jan. 14, grading, curbing, sidewalks, warrenite surfacing 103,860 sq.ft. Santa Barbara Ave. between Bway. Pl. and Figueroa St.

Calif., Menlo Park—Jan. 13, by F. Kurtz, city clk., curbing, guttering, grading, emulsified asphalt surfacing 670,500 sq.ft. College Ave. B. J. Mehl, city engr.

Calif., Oakland — City Council taking bids and open same Jan. 15, grading, curbing, guttering, penetration macadam surfacing 127,088 sq.ft. or asphaltic concrete repaving 8th and Fallon Sts.

Delaware—Jan. 27, by State Hy. Dpt., Dover, grading, broken stone base course and concrete paving 4.119 mi. Little Creek-Bay Rd., Contr. 168—7.909 mi. Fleming's Corner-Whiteleysburg, Contr. 175—5.458 mi. Double Bridges-Redden, Contr. 179—clearing, grading, concrete paving 2.623 mi. Fieldsboro-Odessa, Dual Hy., Contr. 182—clearing, grading, small structures, fill 1.797 mi. Odessa-Drawyers, Contr. 182-A; adv. E. N.-R. Jan. 8.

Indiana — Jan. 15, by State Hy. Comn., Indianapolis, grading, drainage structures, concrete surfacing 137,493 sq.yd. Haysville-Loogootee Rd., Federal Aid Project 185, Martin Co. J. J. Brown, hy. dir.

Indiana — Jan. 15, by State Hy. Comn., Indianapolis, **(F.A.P. means Federal Aid Project)**, concrete, bituminous concrete or brick surfacing 6.832 mi. Spencer-Bloomington Rd., State Rd. 46, 20 ft., F.A.P. 123-A, Monroe Co.—6.863 mi. Spencer-Bloomington Rd., State Rd. 46, 20 ft., F.A.P. 123-B, Owen and Monroe Counties—7.878 mi. Brookville-Connersville Rd., State Rd. 1, 18 ft., F.A.P. 182-A, Franklin Co. —8.344 mi. Brookeville-Connersville Rd., State Rd. 1, 18 ft., F.A.P. 182-B, Franklin and Fayette Counties—4.851 mi. Goshen-Bristol Rd., State Rd. 15, 20 ft., F.A.P. 217, Elkhart Co.—0.2 mi. Wirt-North Vernon Rd., State Rd. 7, 18 ft., F.A.P. 164-A-1, Jefferson Co. State furnishes cement. J. J. Brown, dir.

Maine — Jan. 14, by State Hy. Comn., Augusta, grading, draining, concrete surfacing 6.59 mi. F.A. Projects 87-E and 101-C Wells. L. D. Barrows, ch. engr.

Md., Baltimore — Jan. 14, by Bd. Awards, grading 37,000 cu.yd. streets listed in Contr. 570; sheet asphalt paving 7,150 sq.yd. streets listed in Contr. 569. N. L. Smith, Municipal Bldg., hys. engr.

Mass., Waltham—See "Contracts Awarded."

Mass., Winthrop—See "Contracts Awarded."

Michigan — Jan. 13, at office J. T. Sharpensteen, div. br. engr. Escanaba, grading, shaping, drainage, concrete paving 0.322 mi. MO21-6, Contr. 10, Delta Co., for State Hy. Comn., Lansing.

Michigan—Jan. 21, at office R. A. Beers, resident engr., Kalamazoo, grading, shaping, drainage, widening, concrete paving 3.778 mi. FO11-29-C-1, Berrien Co., 20 and 40 ft., for State Hy. Comn., Lansing.

Mich., Saginaw West Side — Jan. 10, by Saginaw Co. Road Comn., shaping, draining, Class F, rein.-con. paving 6 mi. Assessment Dist. Rd. 135, 20 ft. H. A. Barnett, Saginaw, co. engr.

New Jersey—Jan. 19, by State Hy., Comn., Trenton, grading, 8 in. single line rein.-con. and 8 in. gravel paving 4.79 mi. Route 48, Sect. 24, McKee City, to Tilton Rd., Atlantic Co. A. L. Grover, ch. clk.; adv. E. N.-R. Jan. 8.

N. Y., Brooklyn—Jan. 14, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, regulating, permanent asphalt on 6 in. concrete paving Wyckoff Ave.; regulating, recurbing, permanent asphalt on 6 in. concrete paving, 12th and 24th Aves., East 48th, East 53rd, and 62nd Sts.

N. Y., New York—Jan. 12, by J. Miller, pres. Manhattan Boro, Municipal Bldg., regulating granite block on concrete repaving 9th Ave. from 34th to 45th Sts.

N. Y., New York—Jan. 15, by J. Miller, pres. Manhattan Boro, Municipal Bldg., regulating, widening, sheet asphalt on concrete repaving West 92nd St.—regulating granite block on concrete repaving Rose St.—curbing, sidewalks on Dyckman St.—installing 12 ft. radius southeast corner 165th St. and Bway and at 137 other points—removing rock on easterly side Riverside Dr.—altering sewer in Pine St.

N. Y., North Salem — Jan. 20, by C. MacDonald, engr. Westchester Co., Court House, White Plains, grading, rein.-con. paving 1.36 mi. Bloomer St., Co. Rd. 39; adv. E. N.-R. Jan. 8.

O., Cincinnati—Jan. 13, by C. A. Dykstra, city mgr., City Hall, granite curbing, cement sidewalks, concrete paving 6,000 sq.yd. Beekman St., from Queen City to Fairmount Aves. $27,420.

Okla., Tulsa—Jan. 16, by City Comn., E. Logan, aud., grading, curbing, guttering, sewers, Class F 7 in. paving 3,934 sq.yd. Delaware Pl., Street Impvt. Dist. 1068, $16,023; 5,402 sq.yd. 13th St., Street Impvt. Dist. 1069. $21,141. H. A. Parker, Municipal Bldg., engr.

Oregon — Jan. 15, by State Hy. Comn., Multnomah Co.' Courthouse, Portland, grading, broken stone or crushed gravel surfacing 17.65 mi. Eagle Point-Trail Sect.; of Crater Lake Hy., Jackson Co.—grading 5.47 mi. Doyle Hill-Gate Creek Sect. McKenzie Hy., Lane Co.—12.9 mi. Dalles-Biggs Sect. Columbia River Hy., Wasco and Sherman Counties—11.9 mi. Wilcox-Shaniko Sect. Sherman Hy., same counties—broken stone surfacing, furnishing broken stone in stock piles, for construction 10 mi. Berry Creek-Florence Sect. Roosevelt Coast Hy., Lane Co.—17.7 mi. Willow Creek-Valade Ranch Sect. Ochoco and John Day Hys., Wheeler and Grant Counties—grading, broken stone and gravel surfacing 24.8 mi. Bear Springs-Maupin Sect. Wapinitia Hy., Wasco Co. — non-skid wearing surface on bituminous pavement 32.2 mi. Portland-Hood River Co. line Sect. Columbia River Hy., Multnomah Co.—3 culverts between Fish Hatchery and Vida, on McKenzie Hy.—1 concrete arch and 2 concrete bridges on Lincoln Co. Line-Bob Creek Sect. Roosevelt Coast Hy.—2 concrete arches and 4 concrete bridges on Ten Mile Creek-China Creek Sect. of same hy., all in Lane Co.—2 concrete bridges on Cape Perpetua-Lane County Line Sect. Roosevelt Coast Hy., Lincoln Co. R. A. Klein, Salem, state hy. engr.

Tennessee—Jan. 30, by State Dpt. Hys. & P. Wks., Nashville, improving 12 hy. projects. $750,000. R. H. Parker, hy. comr.

Texas—Jan. 19, by State Hy. Dpt., Austin, G. Gilchrist, hy. engr., bituminous on caliche base course surfacing 12.127 mi. Hy. 9, Federal Aid Project 563-A, Unit 2, Sterling Co. $110,000.

Virginia—State Hy. Comn., Richmond, soon takes bids grading, surfacing 30 projects, $3,000,000. H. G. Shirley, state hy. comr.

Washington—Jan. 20, by S. J. Humes, dir. State Hys., Olympia, clearing, grading 1.3 mi. State Rd. 10, Entiat Ferry Sect. of Chelan Falls to Orondo F.A.P. 145-H, Douglas Co.; 2.8 mi. State Rd. 12, Potters to Stuart's Sloughs between Sound Bend and Palix River, F.A.P. 178-A, Pacific Co. rein.-con. girder bridge over Great Northern Ry. tracks on State Rd. 1, Blanchard, Skagit Co.

CONTRACTS AWARDED

Arizona—State Hy. Comn., Phoenix, to Lee Moor Constr. Co., Two Republics Bldg., El Paso, Tex., grading, drainage structures, subgrade surfacing 6.32 mi. Safford State Line Hy., Federal Aid Project 88-C $51,860; Globe-Safford Hy., Federal Aid Project 15-D, $53,556; concrete ford Phoenix-Yuma Hy., Federal Aid Project 53, $7,113. Grand total $112,529. Noted Dec. 18.

Arizona—State Hy. Comn., Phoenix, surfacing and oiling 30 mi. Globe-Safford Hy., Federal Aid Project 87-B, to Martin Bros. Trucking Co., 1389 Gladys Ave., Long Beach, Calif., $77,040; sub-surfacing 9.3 mi. Ash Fork-Seligman Rd., Federal Aid Project 57, to Yglesias Bros., Inc., 560 Spreckles Theatre Bldg., San Diego, Calif., $19,307. Noted Dec. 18.

Arizona — State Hy. Comn., Phoenix, oil processing 16.5 mi. road between Topock and Oatman, to Gribble & Burke, 1242 South Maryland Ave., Glendale, Calif., $28,585. Noted Dec. 4.

Arizona — State Hy. Dpt., Phoenix, oil processing 16.5 mi. Topock-Oatman Hy., Mohave Co., to Martin Bros. Trucking Co., Long Beach, Calif., $30,000.

Arizona—State Hy. Comn., Phoenix, grading, bridging 4 mi. Benson-Vail Hy., Federal Aid Project 18-D and E, reopened, Cochise Co., to N. G. Hill & Co., 1344 East McKinley St., Phoenix, $77,123; 0.4 mi. Nogales-Pagatonia Hy., A. F. E. 8202, Pima Co., to Skeels & Graham Co., 710 Consolidated Bank Bldg., Tucson, $10,710. Noted Dec. 4.

Ariz., Tucson—Pima Co., oil processing 40.4 mi. roads, to White & Miller, P. O. Box 178, $124,359.

Calif., Los Angeles — M. Beatty, clk. Los Angeles Co., grading, curbing, sidewalks, guttering 2 in. bitumes paving 106,500 sq.ft., 4 in. disintegrated rock base paving 107,800 sq.ft. County Impvt. 950-Banning Blvd., to Sully-Miller Contg. Co., 1500 West 7th St., Long Beach, $37,940. Noted Nov. 27.

Calif., Los Angeles—Bd. P. Wks., City Hall, grading, curbing, Huntington Dr. N., to Curtis Paving Co., 2440 East 26th St., $66,625.

Calif., Oakland—City Council, F. C. Merritt, clk., grading, pipe conduits, concrete paving 155,000 sq.ft. East 10th St., to Heafey-Moore Co., 344 High St., $34,972. Noted Dec. 18.

Calif., Oakland—City Council, F. C. Merritt, city clk., grading, curbing, sidewalks, concrete paving 485,000 sq.ft. Foothill Blvd. between Parker Ave. and Hollywood Blvd., to M. J. Bevanda, Elks Bldg., Stockton, $119,640.

Idaho—J. D. Wood, comr. P. Wks., Boise, grading, drainage structures using concrete pipe 7.228 mi. Old Oregon Trail, Southern Branch, to Federal Aid Project 144-B, to Triangle Constr. Co., 1220 Ide St., Spokane, Wash., $49,523. Noted Dec. 18.

Idaho — J. D. Wood, comr. P. Wks., Boise, grading, draining 5.986 mi. Idaho Co., to Morrison Knudsen Co., 319 Bway., Boise, $38,468—crushed rock surfacing same road, to M. J. Kinney, Spokane, Wash., $31,000—grading.

Streets and Roads (Continued)

draining, surfacing 2.831 mi. Nez Perce Co., to F. J. Redmon, Yakima, Wash., $56,513. Grand total $125,981. Noted Dec. 11.

Ill., Chicago—Bd. Local Impvts., City Hall, to John Dillon & Co., 2953 South Halsted St., grading, curbing, guttering, sewers, 8 in. concrete paving Baltimore and Chappel Aves., $15,-745—to Paramount Constr. Co., 82 West Washington St., Rascher Ave., $54,740—to Ready Coal & Constr. Co., 11524 South Michigan Ave., West 56th St., South Kildare and South Kolin Aves., $39,079; Tripp Avenue System, $121,508—to Farr Bros. Co., 356 West 111th St., West 78th St., South Seeley and South Hoyne Aves., $21,-522—to Calumet Coal Co., 9022 Commercial Ave., Wallace, 96th, 97th, 98th and 99th Sts., Emerald, South Union and Love Aves., $55,043—to Hedges Constr. Co., 64 West Randolph St., Wellington Ave., $10,456—to Robert R. Anderson Co., 625 North Kedzie Ave., North Meade Ave., $166,055—to J. M. Bransfield Co., 3525 South Leavitt St., South Wood St., $76,205—to Barber Paving Co., 7 South Dearborn St., removing trees, grading, curbing, guttering, sewers, asphalt on 8 in. concrete paving West 83rd St., $12,265—to White Paving Co., 1735 Fullerton Ave., grading, curbing, guttering, sewers, asphalt on 6 in. concrete paving North Merrimac Ave., $28,304; North Paulina St., $30,029; Wellington Ave., $30,489, North Sacramento and Albion Aves., $92,110 — to American Asphalt Paving Co., 133 West Washington St., West 128th Pl., South Peoria and South Green Aves., $431,897. Grand total $1,216,236.

Indiana — State Hy. Comn., Indianapolis, grading, drainage structures 4.23 mi. Greene Co., to Hodgkin-Adams Co., Inc., Winchester, Ky., $60,392 est. $90,144; grading, culverts, concrete paving 9.981 mi. Spencer Co., to Hanson Bros., Inc., Terre Haute, $153,888 est. $185,039. Noted Nov. 6.

Ind., Evansville — Vanderburgh Co., gravel surfacing 2.5 mi. St. Joseph Avenue Rd., to H. L. Johnson Co., Lewisport, $20,450. Est. $39,-920. Noted Dec. 18.

Ind., Evansville—Vanderburgh Co., concrete surfacing Golf-Moor Dr., to Reichert Constr. Co., 418 Northwest Riverside Dr., $25,988. Noted Dec. 11.

Kansas—State Hy. Comn., at Court House, Emporia, to A. L. Cook, Ottawa, grading, culverts 12.409 mi. roads in Rice Co. $55,901; 1.174 mi. Cowley Co. $32,488; 11.953 mi. Comanche Co. $61,667 — to Wyland & Yard, Boonville, Mo., $38,952. Grand total $189,008. Noted Dec. 11.

Kansas—State Hy. Comn., at Court House, Lawrence, grading, culverts 6.621 mi. road in Osage Co., 30 ft., to Rogers Constr. Co., Abilene, $35,604; 9.511 mi. Douglas Co., 30 ft., to Reed & Wheelock, Clay Center, $110,078.

Kansas—State Hy. Dpt., at Court House, Ft. Scott, grading culverts 8.273 mi. Allen Co. and 9.596 mi. Greenwood Co., to Dan Scherrer Constr. Co., 329 North 18th St., Kansas City, $42,873 and $59,873 respectively —3.021 mi. Coffey Co., to J. J. Thompson, Omaha, Neb., $25,083—grading, culverts, concrete paving 3.624 mi. Federal Aid Project 431-A and 1.506 mi. same road Sect. B, Bourbon Co., to J. A. Tobin Constr. Co., 7601 Myrtle St., Kansas City, Mo., $103,045 and $46,759 respectively. Grand total $277,633. Noted Dec. 11.

Maryland — State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 2.4 mi. Federal Aid Project 197-B reopened, Contr. W-58-63, Washington Co., to H. W. Kaylor, Hagerstown, $145,842. Noted Nov. 20.

Md., Baltimore—Bd. Awards, concrete paving 8,000 sq.yd. footways in Footway Contr. 6, to T. Maggio, 16 North Front St., Baltimore, $16,605. Noted Dec. 11.

Massachusetts—Dpt. P. Wks., Boston, rein.-con., bituminous macadam paving (dual type), 31,565 ft. Marlboro and Northboro, to B. Perini & Sons, Ashland, $467,279 — rein.-con. paving 34,400 ft. Foxboro, Wrentham, Plainville and North Attleboro, to D. V. Frione, 505 Grand Ave., New Haven, Conn., $470,585—bituminous macadam paving 13,921 ft. Southbridge and Sturbridge, to New Haven Road Constr. Co., 1817 Dixwell Ave., New Haven, Conn., $116,782. Grand total $1,054,646. Noted Dec. 18.

Massachusetts—Dpt. P. Wks., State House, Boston, bituminous macadam paving 11,770 ft. by. in Weston (2 sections), to P. Salvucci, 55 Pond St., Waltham, $254,457. Noted Dec. 18.

Mass., Waltham — Street Dpt., City Hall, bituminous macadam resurfacing South St., day labor. $25,000.

Mass., Winthrop — Town, Bd. Selectmen, J. J. Mahany, in charge widening Revere St., separate contracts. $55,000 appropriated by town as its share, balance of cost to be borne by Government.

Neb., Omaha — Douglas Co., Court House, grading, concrete paving 23,130 sq.yd. Rd. 36 (84th St.) from Center to Q Sts., to Yant Constr. Co., Omaha Natl. Bank Bldg., Omaha, at $1.53 per sq.yd. Noted Dec. 22 Daily.

New Hampshire—State Hy. Dpt., Concord, 2½ in. on 5 in. broken stone base coarse surfacing 2.85 mi. East Side Rd., in Coos and Pinkham Notch, 24 ft., to John F. Rooney & Co., Milford, Mass., $62,782. Est. $125,000.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, asphalt paving Autumn Ave., to D. J. McCoy Asphalt Co., Avenue U and East 57th St., $9,274—East 5th St., to B. Turecamo Contg. Co., New Cropsey Lane, $19,-651—Milfors St. and Patchen Ave., to Pomonk Asphalt Paving Material Co., 1246 Grand Ave., $5,256 and $17,848 respectively. Grand total $52,029. Noted Dec. 4.

N. Y., Long Island City—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., asphalt paving 90th St. and 41st Ave., to Borough Asphalt Paving Co., 1301 Metropolitan Ave., Brooklyn, $19,043 and $16,150 respectively—24th St., to C. Bennett Impvt. Co., 465 Fenimore St., $15,-103—grading 66th St., to Marmoth Constr. Co., 94-14 108th Ave., Jamaica, $4,224—49th Ave., to O. B. Junior Contg. Co., 8625 137th St., Jamaica, $475. Grand total $54,995. Noted Dec. 11.

N. Y., New York—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., regulating Tibbett Ave., to A. Mascio, 704 West 182nd St., $7,860—Waterbury Ave., to Amana Contg. Co., 3206 Webster Ave., $9,979—Goulden Ave., to Morris Park Contg. Co., 1991 Cruger Ave., $50,809—sewers in Adams Pl., to A. Caserta, 2442 Barnes Ave., $1,416 — Jerome Ave., to Anita Constr. Co., 410 200th St., $8,681. Grand total $78,745. Noted Dec. 18.

N. Y., New York—J. Miller, pres. Manhattan Boro, Municipal Bldg., asphalt paving West 144th St., to C. D. Beckwith, Inc., Seneca Ave. and Edgewater Rd., $6,121. Noted Dec. 18.

N. Y., New York—J. Miller, pres. Manhattan Boro, Municipal Bldg., steel ramp for viaduct at Riverside Dr., to Eastern Constr. Co., 110 West 40th St., $8,223. Noted Dec. 11.

N. Y., New York—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., grading, curbing, Watt Ave., to P. Gabriel, 2750 Creston Ave., $13,121; Pearsall Ave., to S. LaBarbera, 65 Webster Ridge, New Rochelle, $2,878. Noted Dec. 11.

O., Akron—Summit Co., grading, draining, gravel surfacing 2 mi. Theiss Rd. and Akron-Northampton Rd., to T. L. Smith, 1958 Newton St., $17,640. Est. $26,000.

O., Chardon—Geauga Co., waterbound macadam paving 3 mi. Leroy Rd., to Troyer Constr. Co., Aurora, $23,450. Est. $26,457. Noted Dec. 11.

O., Cincinnati — Concrete paving 1,380 ft. Ring Pl. from Grand Ave. to its eastern terminus, 30 ft., to Ace Constr. Co., 2744 Massachusetts Ave., $27,250. Est. $29,737.

Oklahoma — State Hy. Dpt., Oklahoma City, grading, drainage structures 4.977 mi. F.A.P. 293-A, and 6.765 mi. F.A.P. 264-B, 32 ft., Woods Co., to Schultz Constr. Co., Alva, $30,-353 and $15,306 respectively, est. $35,000 and $25,000 respectively. Noted Dec. 11.

Okla., Oklahoma City—City Council, widening 7 blocks West 29th St. from Virginia to Western Aves., 36 ft., to M. A. Swatek & Co., 519½ West Main St., $38,161 est. $40,000; grading, paving 5 blocks Durland and Linn Sts., to Western Paving Co., Petroleum Bldg., $25,926 est. $27,000.

Okla., Tulsa—E. Logan, city aud. grading, drainage structures, Class F 7 in. concrete paving 7,333 sq.yd. Street Impvt. Dist. 1065-Yorktown Ave., to Calumet Constr. Co., 840 East Apache St., $34,305. Est. $36,117.

Pa., Pittsburgh — E. G. Lang, c/o Dpt. P. Wks., City-County Bldg., grading, curbing, guttering, sewers, razing, removing 4 buildings, blockstone on concrete surfacing 10,960 sq.yd. Independence St., to Nardulli & Sons Co., 1315 Washington Blvd., $102,871. Est. $160,000. Noted Dec. 18.

Pa., Pittsburgh — Bd. P. Wks., City Hall, grading, curbing, paving Kenilworth Ave., to Minsinger Co., 1201 Vickroy St., $5,419—Trevanion St., to Carcia Constr. Co., 4200 Kansas St., $2,814—Guthrie St., to Nardulli & Sons Co., 1315 Washington Blvd., $8,940 — Sanders St. and Agate Way, to M. O'Herron Co., South 1st and McKean Sts., $29,319—sewers in Ceres Way and Younger Ave., to Ledonne & Casper, 7305 Frankstown Ave., $419 and $2,557 respectively—Boggs Ave., to James & Rocco Very, 701 Hays St., $422. Grand total $32,815.

Tex., Dallas—City, Willite asphaltic concrete paving 7,242 sq.yd. Ervay St. from Pacific to Ross Sts., to H. L. Cannady & Co., Santa Fe Bldg., $29,694.

Tex., Sweetwater—L. S. Polk, city compt., grading, curbing, guttering, sidewalks, paving 40,600 sq.yd., to Jagoe Constr. Co., Denton, plain concrete $1.78 per yd., and Uvalde rock asphalt $1.65 per yd. Est. $75,000. Noted Dec. 11.

Utah—State Rd. Comn., Capitol Bldg., Salt Lake City, improving 16.067 mi. Midland Trail, Grand Co., to W. W. Clyde & Co., Springville, $117,823. Est. $141,623.

Utah, Salt Lake City — Salt Lake Co., concrete paving 1.8 mi. 9th East St. from 33rd South to 48th South Sts., to Gibbons & Reed, Kearns Bldg., $51,876. Noted Dec. 18.

Wash., Seattle—Bd. P. Wks., City Hall, paving Judkins St. et al., to Moceri Bros., 2025 Jackson St., $56,334.

W. Va., Charleston — Kanawha Co., grading, drainage structures 2.1 mi. State Project 2216 and Project 2217, to Venable & Farkas, Morrison Bldg., $69,704.

W. Va., New Cumberland—Hancock Co., concrete surfacing 2.66 mi. Culler Hill Rd., Butler Dist., to J. R. Rice, Belmont, O., $83,000.

W. Va., Weirton—Hancock Co. Court, New Cumberland, brick paving 2.66 mi. Culler Hill Rd., 20 ft., to Keely Constr. Co., Clarksburg, $80,049. Est. $100,000. Noted Dec. 4.

Wis., Milwaukee—Dpt. P. Wks., to Messinger Constr. Co., 5107 North Ave., paving alley between North 4th and North 5th Sts. $2,081; alley between South Vernon and South Superior Sts. $686; alley between South Williams and South Lenox Sts. $1,440; alley between East Oklahoma and East Euclid Sts. $5,658—to P. Scherkenbach & Son, 30th Ave., South Austin St., $1,574—to F. M. Gogliano, 741 Jackson St., West St. Paul St., $12,052—to W. F. Hunt, 441 Bway., East Clybourn St. $3,572; West Forest Home Ave. $57,606—to Badger Constr. Co., 97 East Wisconsin Ave., East and West Walnut St. $5,514; West State St. $40,092. Grand total $130,275.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Ill., Erie—Bd. Comrs. Whiteside-Rosk Island Special Drainage Dist., Whiteside Co., 30 mi. ditches, incl. 800,000 cu.yd. excav., 180,000 g.p.m. pump station. Caldwell Eng. Co., Jacksonville, engrs.

Ill., Lawrenceville—Bd. Comrs. Big Slough Drainage Dist., Lawrence Co., cleaning out 6 mi. drains. $15,000.

Ind., Hammond—Bd. Comrs. Lake Co., Williams Ditch 2, 217,000 cu.yd. excav. $27,000. J. D. Murphey, Hammond, engr.

Ind., Logansport—Bd. Comrs. constructing 21 mi. Gault Ditch. $50,000. J. Chase, Logansport, engr.

Ind., Marion—Bd. Comrs. Grant Co., Hammond Ditch, incl. 30,500 cu.yd. excav. $36,500. A. E. Ratliff, Marion, engr.

Ind., Newcastle—Bd. Comrs. Henry Co., Flat Rock Dredging Project. $100,000. O. Kirkham, Newcastle, engr.

Ind., South Bend—Bd. Comrs. St. Joseph Co., Coquillard Ditch, incl. 101,099 cu.yd. excav.; Worm Ditch, 76,926 cu.yd. excav.; Schamehorn Ditch, 35,132 cu.yd. excav.; State Drain, 176,-000 cu.yd. excav. $52,196. F. P. Crowe, South Bend, aud.

Ind., Vincennes — City levee along Wabash River from Semina to Kelso Creek, incl. 14,565 ft. 12- to 42-in. concrete pipe, 133,000 cu.yd. embankment, 10,000 cu.yd. earth excav., 9 lift gates, 4 automatic gates, 42 manholes. $110,-000. D. Muentzer, Vincennes, clk. Noted Dec. 4.

Ind., Warsaw — Bd. Comrs. Kosciusko Co., Coppers Ditch, 3 mi. long, Plain Twp. $25,000. D. H. Lesaig, Warsaw, engr.

Ind., Winamac — Bd. Comrs. Pulaski Co. soon takes bids redigging 20 mi. Monon Ditch. $200,000.

Mass., Winthrop—Commonwealth of Massachusetts, Dpt. P. Wks., State House, Boston, 1,200 ft. breakwater, off "The Crest." F. E. Lyman, comr. To exceed $25,000.

Okla., El Reno—Bd. Comrs. Banner D. D. 6, Canadian Co., drainage work, incl. 119,235 cu.yd. excav. Project in abeyance. H. Powell, El Reno, engrs. Noted Nov. 27.

Okla., Okarche—Canadian Co. (El Reno), 7 mi. drainage ditch, incl. 400,000 cu.yd. dry earth excav., Oak Twp. $90,000. H. D. Powell, El Reno, engr.

Tennessee—State Dpt. Hys. & P. Wks., Nashville, spillway at Reelfoot Lake, Obion Co. $110,000. Work starts soon. T. C. McEwen, state hy. engr.

Ont., Collingwood—See "Sewers."

BIDS ASKED

Ind., Auburn—Bd. Comrs. De Kalb Co., bids about Feb. 1, Cedar Creek Drain, 18 mi. long. $100,000. E. Dawson, Auburn, aud.

Kan., Muscotah—Jan. 12, by Bd. Directors Delaware D. D. 2, at its office, R.F.D., Muscotah, drainage ditch 10 mi. on Walnut Creek and Delaware River, 5 mi. on Grasshopper Creek, 4 mi. tributaries, incl. 1,192,500 cu.yd. excav., 51,000 lin.ft. clearing old channel, 150 acres clearing and grubbing right-of-way, 1,000 lin. ft. 18 in. corrugated iron pipe. E. T. Archer & Co., New England Bldg., Kansas City, Mo., engrs.

N. Y., New York—Jan. 14, by H. P. Swift, chn., Hunter College Lands & Buildings Com. of Bd. Higher Educ., at office Secretary Hunter College, Park Ave. and 68th St., excavating southerly portion site, filling and rough grading around instruction Unit 1, for Hunter College, on site bounded by Bedford Park Blvd., Goulden, Jerome and Navy Aves. Thompson, Holmes & Converse and C. B. Meyers, 101 Park Ave., archts.

O., Akron—Jan. 14, by Comrs. Summit Co., dredging, widening, straightening 8,700 ft. Mud Run Ditch from Tuscawaras River to Norway Ave. $34,000. H. G. Sours, Court House, engr.

B. C., Vancouver—Jan. 9, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., dredging Vancouver Harbor. $26,000.

CONTRACTS AWARDED

Ark., Pine Bluff — Sub-Dist. 1 of D. D. 2, Jefferson Co., enlarging existing ditches, new ditches, incl. 420,000 cu.yd. excav., to Newell Contg. Co., Martin Bldg., Birmingham, Ala., $60,000. Noted July 31.

Calif., Long Beach — City Council, 45,000 cu.yd. clamshell dredging, placing 600 tons rock for bulkheads and constructing bulkhead

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Excavation, Drainage, Irrigation, Levees (Cont.)

at Bertha 19-B and 3-A, to Merritt-Chapman & Scott Corp., 720 Wilmington Ave., San Pedro, $26,950.

Ind., Ft. Wayne — A. W. Grosvenor, comr. Hamm Joint Interstate Ditch or Interceptor, Allen Co., incl., 2 culverts, 5,000 lin.ft. 6- to 15-in. clay drain tile, 36 catch basins, 235,127 cu.yd. excav., to Bremen Dredge & Excavating Co., Bremen, $28,497. Noted Dec. 4.

Ind., Fowler—Benton Co., constructing Prudential Ditch, incl. 11,500 ft. open drain, 75,000 cu.yd. excav., to W. F. Sternberg, Piper City, Ill. Noted Dec. 18.

Ind., Goshen — J. H. Brown, construction comr., Horn Ditch and 5 laterals, Benton, Clinton and Elkhart Twps., Elkhart Co., incl. 84,471 cu.yd. excav., 13,100 ft. tile, to Witter Constr. Co., Whiting. Noted Nov. 20.

Ia., Clinton—Clinton Co. at office F. Lohberg, aud., open ditch work in D. D. 15, incl. 160,900 cu.yd. excav., to W. P. Collins, Honey Creek. Noted Dec. 18.

La., Hammond — J. M. Blache, pres. Bd. Comrs. Tangipahoa D. D. 1, Tangipahoa Parish, gravity drainage system, to Coastal Constr. Co., Memphis, Tenn., $43,000.

La., Hammond—Tangipahoa D. D. 1, Tangipahoa Parish, City Hall Bldg., excavation, clearing, cleaning channels, to Coastal Constr. Co., Memphis, Tenn., $43,000. Noted Dec. 18.

Mass., Falmouth — Cottage Club, Falmouth Heights, stone jetty, timber pier, Falmouth Heights, to A. K. Finney, 130 Sandwich St., Plymouth. Est. $25,000. Noted Mar. 13.

Public Bond Elections

Coming Bond Elections

Waterworks Impvts.—Twin Falls, Idaho, $90,000.

Waterworks Impvts.—Abilene, Tex., $1,000,000.

Waterworks—Tex., San Patricio County Fresh Water Dist. 1, Jan. 17, $80,000.

Park Impvts.—Abilene, Tex., $100,000.

Schools—Rock Springs, Wyo., Jan. 20, $350,000.

Bonds Defeated

Storm Sewers—Manhattan, Kan., $250,000.

Sewer Extensions—Sayre, Okla., $37,000.

Sewage Disposal Plant—Cleveland, Miss., $200,000. (Election postponed.)

FEDERAL GOVERNMENT

PROPOSED WORK

Arizona — BRIDGE — Pub. Rds., 508 Ellis Bldg., Phoenix, 145 ft. span bridge, approaches over Verde River, near mouth of Tangle Creek, Coconino Co. C. H. Sweetser, Phoenix, dist. engr.

Arizona—SCHOOLS—U. S. Indian Bureau, Phoenix, Ariz., and Wash., D. C., Indian Schools on Western Navajo, Pima, Fort Apache, Carlos and Southern Navajo Reservations.

Ind., Muncie—POST OFFICE—Treas. Dpt. at office Sup. Archt., limestone post office, Charles and High Sts.

Ind., Warsaw—POST OFFICE—Treas. Dpt. at office Sup. Archt., post office, Lake and Market Sts. Noted Sept. 18.

Minnesota and Wisconsin — DREDGING — U. S. Eng., Duluth, Minn., in Duluth-Superior Harbor, in Ashland, Wis. and Duluth, Minn. Noted June 19.

Nev., Las Vegas—FEDERAL BUILDING—Treas. Dpt. at office Sup. Archt., federal building.

O., Jackson—POST OFFICE—Treas. Dpt. at office Sup. Archt., 3 story, basement, 57 x 81 ft. post office, Main and Columbus Sts.

Pa., Phila.—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by Rankin & Kellogg, 17th and Sansom Sts., post office, 30th and Market Sts.

Pa., Pittsburgh — DAM — U. S. Eng. bids early in 1931 concrete, steel dam downstream from site of present Lock 4.

Tenn., Nashville — POST OFFICE — Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Texas—DREDGING—U. S. Eng., Galveston, soon takes bids section Intracoastal Canal between Galveston and Port Arthur. Noted Dec. 4.

Tex., San Antonio—BARRACKS—Con. Q. M., Duncan Field, bids early in 1931, 3 story, 60 x 240 ft., rein.-con., tile, plain found., at Duncan Field.

Tex., San Antonio—COMPANY BARRACKS—Con. Q. M. soon takes bids company barracks at Camp Normoyle. Noted Jan. 1.

Tex., Waco—HOSPITAL—Vet. Bu. Arlington Bldg., soon takes bids 7 or 8 buildings, incl. hospital, nurses home, dormitory, heating plant, laundry plant, utilities building, laboratory and hospital equipment, for U. S. Veteran's Hospital. Noted Dec. 25.

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BIDS ASKED

Ala., Montgomery—DREDGING—Jan. 19, by U. S. Eng., dredging channel in Choctawatchee Bay.

California — ROAD — Jan. 15, by C. H. Sweetser, dist. engr., P. Rds., 461 Market St., San Francisco, grading, crushed rock surfacing 4.144 mi. Sect. E, Shady Flat-Downieville Rd., Route 26, Yuba Pass Natl. Forest Hy., Sierra Co.

Calif., March Field (br. Riverside)—PAVING—Jan. 14, by Con. Q.M., concrete paving airport fronting hangars; adv. E. N.-R. Jan. 8.

Calif., Mare Island — BARRACKS, etc. — Spec. 6330 — Jan. 28, by Yards & Docks, Navy Dpt., constructing barracks and mess halls.

Conn., Bridgeport—DREDGING—Jan. 23, by U. S. Eng., Providence, R. I., 873,600 cu.yd. Bridgeport Harbor; adv. E. N.-R. Jan. 8.

Del., Wilmington—DREDGING—Jan. 22, by U. S. Eng., 854,500 cu.yd. material from Wilmington Harbor; adv. E. N.-R. Jan. 8.

D. C., Wash.—INDUSTRIAL TRUCK—Jan. 9, by A. L. Flint, genl. purch. officer Panama Canal, industrial truck, metal roofing, cast-iron pipe, dies drills, wrenches, etc., Schedule 2621.

Florida — DREDGING — Jan. 15, by U. S. Eng., Jacksonville, 325,000 cu.yd. soft material in channel of approach to Port of St. Petersburg.

Florida—DREDGING—Jan. 19, by U. S. Eng., P. O. Box 45, Jacksonville, 730,000 cu.yd. from St. Johns River, vicinity Dames Point; adv. E. N.-R. Jan. 8.

Fla., Punta Gorda—DREDGING—Jan. 29, by U. S. Eng., Jacksonville, 31,000 cu.yd. place measurement in channel of approach to municipal pier and turning basin in Charlotte Harbor; adv. E. N.-R. Jan. 8.

Georgia—DREDGING—Jan. 15, by U. S. Eng., Savannah, 155,000 cu.yd. between Seaboard Air Line R.R. bridge and Kings Island, Savannah River; 475,000 cu.yd. mud, sand and shell; 370,500 cu.yd. at Brunswick Harbor.

Illinois—DIKES—Jan. 16, by U. S. Eng., 428 Customhouse, St. Louis, Mo., 3,000 lin.ft. piling dikes at Sulphur Springs and James Landing; 3,500 lin.ft. at Ste. Genevieve Island and Klondike Landing; 3,000 lin.ft. at Union Point and Hanging Dog Island; 2,500 lin.ft. Gibney Island; 2,000 lin.ft. at Burnham Island and Goose Island Towhead; 2,000 ft. at Buffalo and Dogtooth Islands; all in Mississippi River; adv. E. N.-R. Jan. 8.

Illinois—LOCK and DAM—Jan. 30, by U. S. Eng., 1st Chicago Dist., 333 North Michigan Ave., Chicago, completing construction Dresden Island Lock and Dam on Illinois River; adv. E. N.-R. Jan. 8.

Illinois—LOCK and DAM—Feb. 2, by U. S. Eng., 1st Chicago Dist., 333 North Michigan Ave., Chicago, completing construction Brandon Road Lock and Dam on Des Plaines River; adv. E. N.-R. Jan. 8. Noted Dec. 11.

Ind., Kokomo—POST OFFICE—Jan. 30, by Treas. Dpt. at office Sup. Archt., U. S. Post Office. Noted Dec. 4.

Louisiana—DREDGING—Jan. 13, by U. S. Eng., Poland St., New Orleans, 130,000 cu.yd. Dupe Cut, Barataria Bay.

Louisiana—DREDGING—Jan. 15, by U. S. Eng., New Orleans, 70,000 cu.yd. maintenance dredging through bar at lower end Calcasieu Lake.

Me., Portland—FOUNDATION—Jan. 12, by Treas. Dpt. at office Sup. Archt., foundation for court house extension, Federal St.

Md., Aberdeen Proving Ground—HOSPITAL—Feb. 4, at office Con. Q. M., constructing, completing hospital; adv. E. N.-R. Jan. 8.

Md., Perry Point—CONVALESCENT BUILDING—Feb. 3, by Vet. Bu., Arlington Bldg., 1 N. P. convalescent building, at U. S. Veteran's Hospital.

Mass., Boston—ELEVATOR, etc.—Jan. 20, by Treas. Dpt. at office Sup. Archt., elevator and dumbwaiter plant in U. S. Post Office and Court House.

Mass., Fall River—DREDGING, etc.—Jan. 19, by U. S. Eng., Providence, R. I., dredging, harbor improvements, in Taunton River.

Michigan—DREDGING—Jan. 22, by U. S. Eng., Detroit, 500,000 cu.yd. from Fighting Island Channel, Detroit River; adv. E. N.-R. Jan. 8.

Mich., Selfridge Field—RADIO BUILDING, etc.—Jan. 27, by Con. Q. M., radio building, paint oil and dope warehouse.

Mo., Aurora—POST OFFICE—Jan. 23, by Treas. Dpt., at office Sup. Archt., U. S. Post Office.

Mo., St. Louis—REPAIRING—Jan. 14, by U. S. Eng., 428 Customhouse, repairing U. S. Dredges Selma and Thebes; adv. E. N.-R. Jan. 8.

New Jersey—DREDGING, etc.—Jan. 20, by U. S. Eng., 30 Whitehall St., New York, 62,107 cu.yd. overlying material and 72,182 cu.yd. ledge rock in Raritan River; adv. E. N.-R. Jan. 8.

N. Y., Oneida—POST OFFICE—Mar. 1, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

N. Y., Rochester—BUILDING—Jan. 26, by Superintendent Lighthouses, small brick, tile building at Rochester Harbor; adv. E. N.-R. Jan. 8.

O., Cincinnati — REPAIRING — Jan. 19, by U. S. Eng., materials, tools and equipment for repairing U. S. Towboat "Iroquois"; adv. E. N.-R. Jan. 8.

Pa., Lewisburg—PENITENTIARY—Jan. 19 (extended date), by Treas. Dpt. at office Sup. Archt. federal penitentiary, on west bank Susquehanna River, Union Co. Noted Dec. 4.

Pa., Pittsburgh—LOCK—Feb. 2, by U. S. Eng., Lock 4, Monongahela River; adv. E. N.-R. Jan. 8. Noted Jan. 1.

R. I., Woonsocket—POST OFFICE—Jan. 26, by Treas. Dpt. at office Sup. Archt., extending, remodeling U. S. Post Office; adv. E. N.-R. Jan. 8. Noted Dec. 24..

S. C. Dillon—POST OFFICE—Jan. 27, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Texas—DREDGING—Jan. 20, by U. S. Eng., Galveston, dredging channel from Aransas Pass to Corpus Christi; adv. E. N.-R. Jan. 8.

Tex., San Antonio—RECLAMATION PLANT—Con. Q. M., Duncan Field, bids about Jan. 30, oil reclamation plant, at Duncan field.

Virginia—DREDGING—Jan. 20, by U. S. Eng., 133,075 cu.yd. material from Rappahannoch River; adv. E. N.-R. Jan. 8.

Virginia—DREDGING—Jan. 22, by U. S. Eng., Wilmington, Del., 15,000 cu.yd. in Little Wachipongo River; adv. E. N.-R. Jan. 8.

Wash., Seattle—DREDGING, etc.—Jan. 21, by U. S. Eng., dredging and rock removal at Port Alexander.

Wash., Seattle—FOUNDATIONS, etc.—Jan. 26, by Treas. Dpt. at office Sup. Archt., foundations, etc. for U. S. Federal Office Building. Noted Nov. 20.

W. Va., Charleston—LOCK—Feb. 6, by U. S. Eng., Huntington, constructing Marmet lock and appurtenances on Great Kanawah River, 9 mi. above here; adv. E. N.-R. Jan. 8.

T. H., Pearl Harbor—HANGAR—Spec. 6215—Feb. 18, by Yards & Docks, Navy Dpt., seaplane hangar at U. S. Naval Operating Base.

CONTRACTS AWARDED

Conn., New London — ACADEMY — Treas. Dpt. at office Sup. Archt., general contract 11 brick, steel buildings for U. S. Coast Guard Academy, to Murch Bros. Constr. Co., Railway Exch. Bldg., St. Louis, Mo., $1,818,000. Noted Dec. 4.

Florida—DREDGING—U. S. Eng., Jacksonville, 3,406,000 cu.yd. Indian River, portion Intracoastal Waterway, Jacksonville to Miami, to Clark Dredging Co., 343 South West North River Dr., Miami, $253,314. Noted Dec. 4.

Idaho—PUMP—Bureau Reclamation, Denver, Colo., 180 sec.-ft. pump operating under 31 ft. head, 800 hp. motor, to Pelton Water Wheel Co., 2929 19th St., San Francisco, Calif., $13,836; electrical equipment, to General Electric Co., River Rd., Schenectady, N. Y., $6,293. Noted Oct. 2.

Ill., Bloomington — POST OFFICE — Treas. Dpt. at office Sup. Archt., U. S. Post Office, to J. I. Barnes, Logansport, Ind., $158,500. Noted Nov. 13.

Ill., Rock Island—REPAIRING—U. S. Eng., to E. Eberhard, Guttenberg, Ia., repairing wing and closing dams on Mississippi River between Mile 230 and 315, Item 1, 1,200 cu.yd. each rock and brush at $1.59 and $0.46 per cu.yd. respectively, Item 2, 6,750 cu.yd. each rock and brush $1,615 and $0.46 per cu.yd. respectively, to Watson & Jenkins, Rewey, Wis., Item 3, 900 cu.yd. each rock and brush, $1.64 and $0.36 respectively; to Wilmott & Freese, Bellevue, Ia., Item 4, 1,050 cu.yd. each rock and brush, $1.71 and $0.58 respectively; cu.yd. each rock and brush, $1.77 and $0.57 respectively; to Titus & Orcutt, Clinton, Ia., Item 6, 2,475 cu.yd. rock $1.53, 3,075 cu.yd brush $0.48. Noted Dec. 4.

Mass., Fall River—ELEVATOR—Treas. Dpt. at office Sup. Archt., electric freight elevator in U. S. Post Office, to Haughton Electric & Machine Co., 1103 Vermont Ave., Wash., D. C., $4,055. Noted Jan. 1.

Mont., Lewistown—POST OFFICE—Treas. Dpt. at office Sup. Archt., 1 story, basement U. S. Post Office, to McGough Bros., 1945 Jefferson Ave., St. Paul, Minn., $133,000 (420 Days). Noted Dec. 11 Daily.

Nev., Hawthorne — BUILDINGS — Yards & Docks, Navy Dpt., buildings for mine filling plant, to C. F. Dinsmore Co., Ogden, Utah, $333,800. Noted Dec. 11.

Okla., Oklahoma City—POST OFFICE—Treas. Dpt. at office Sup. Archt., extending, remodeling U. S. Post Office, to Devault & Deitrick, Canton, O., $951,532 (600 days). Noted Nov. 27.

R. I., Pawtucket — POST OFFICE — Treas. Dpt. at office Sup. Archt., heating and plumbing, to Equator Heating Co., 1644 East New York Ave., Brooklyn, N. Y.; electrical work, to M. M. Hochman Electric Co., Providence, R. I. Noted Nov. 20.

W. Va., Morgantown—ELEVATORS—Treas. Dpt. at office Sup. Archt., elevators at U. S. Post Office, to S. Plato, 614 West Walnut St., Louisville, Ky., $71,850 (270 days). Noted Nov. 6.

RAILWAYS

PROPOSED WORK

Colorado—Atchison, Topeka & Santa Fe R.R. Co., W. W. Kelly, ch. engr., (western lines) Amarillo, Tex., c/o H. B. Lautz, assistant genl. mgr., La Junta, improvements for Arkansas Valley in Colorado during 1931, incl. automatic block signal system between Pueblo and La Junta, 6,000 ft. new track at Rocky Ford, 4,000 ft. new track at Manzanola, 17 mi. track replacement east of La Junta, additional equipment in La Junta shops, increasing La Junta switching yards, flood lights in La Junta yards. $500,000.

Oregon—Southern Pacific Ry., G. W. Boschke, ch. engr., 65 Market St., San Francisco, Calif., filling in lake and marsh on 200 acres west side of Lake Ewanna (adjoins Klamath Falls on the south) on which tracks will be laid for industrial site. $200,000.

BIDS ASKED

New Brunswick—Jan. 15, by W. U. Appleton, Moncton, genl. mgr., (Atlantic Region), Canadian Natl. R.R., C. S. Gzowski, ch. engr. system, Montreal, Que., new railway station at St. John.

SUBWAYS AND TUNNELS

PROPOSED WORK

Calif., Oakland — City and Southern Pacific R.R. Co., 65 Market St., San Francisco, G. W. Boschke, ch. engr., 167 ft. subway, 14 ft. vertical clearance, 23 ft. roadway, one 6 ft. sidewalk, incl. 290,000 lb. structural and 240,000 lb. reinforcing steel, 41,700 sq.ft. waterproofing, 16,800 cu.yd. excav., 677 cu.yd. rein.-con. ceiling slab, 368 cu.yd. concrete deck, 139 cu.yd. concrete hand-rail concrete. $205,000.

New York — Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, bids late in fall, vehicular tunnel from East 37th and 38th Sts., New York to Bordon Ave., Long Island City. War Dpt. approved project. Borings and preliminary work after Mar. 1. Private plans. Noted Nov. 27.

CONTRACTS AWARDED

N. Y., Brooklyn—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, Route 107, Sect. 9, Rapid Transit R.R., to Marcus Contg. Co., Inc., 115 Nassau St., New York, $4,970,184. Noted Dec. 11.

N. Y., Long Island City—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, Route 108, Sects. 10 and 11, to Triest Contg. Corp., 247 Park Ave., New York, $6,296,235. Noted Dec. 11.

GRADE CROSSINGS

PROPOSED WORK

Calif., Santa Ana — City grade separation under tracks Southern Pacific R.R. at Santa Fe R.R. and 4th St. incl. rein.-con. grade separation structure, curbing, sidewalks, paving, concrete storm drains, under Acquisition and Impvt. Dist. 9. $150,000. C. L. Jenken, city engr.

N. J., Bogota—Bd. Freeholders Bergen Co., Court House, Hackensack, rein.-con. viaduct over New York Central R.R., West Shore Branch, at Main St. $369,400. R. McClave, Court House, Hackensack, co. engr.

N. Y., Alden—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating Wend Crossing, Erie Co. $116,700.

N. Y., Hoosic—Boston & Main R.R., W. J. Backes, ch. engr., Boston, Mass., eliminating Pease Crossing near Buskirk Station, Rensselaer Co. $134,000.

N. Y., Buffalo — Lehigh Valley R.R. Co., G. T. Hand, ch. engr., 143 Liberty St., New York, Erie R.R. Co., G. S. Fanning, ch. engr., 50 Church St., New York, Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., New York, Chicago, & St. Louis Ry., A. C. Harvey, ch. engr., Terminal Tower, Cleveland, O., Buffalo, Rochester & Pittsburgh R.R. Co., E. F. Robinson, ch. engr., Rochester, New York Central R.R. Co., F. B. Freeman, ch. engr. (lines Buffalo and East) 466 Lexington Ave., New York, and South Buffalo Ry. Co., W. A. James, ch. engr., Lackawanna, eliminating Tifft Street Crossings.

N. Y., Cayuta—Lehigh Valley R.R. Co., G. T. Hand, ch. engr., 143 Liberty St., New York, eliminating Decker Crossing, Schuyler Co. $129,300.

N. Y., Cornwall—New York, Ontario & Western Ry., W. C. Heidenthal, ch. engr., Middletown, eliminating Meadowbrook Road Crossing, Orange Co. $104,000.

N. Y., East Rochester — New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating Washington St. Crossing, Monroe Co. $337,800.

N. Y., Gates—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating Hinchley Crossing, on Howard Rd., Monroe Co.

N. Y., Herkimer—New York, Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating North Ilion Crossing, at Railroad St., Herkimer Co. $166,100.

N. Y., Lewisboro—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating grade crossings at Goldens Bridge Station, Stor and Quicks Crossings, Westchester Co. $255,000.

N. Y., Onondaga—Delaware, Lackawanna & Western R.R. Co., G. J. Ray, ch. engr., Hoboken, N. J., eliminating Plank Rd. crossing, Onondaga Co. $100,000.

N. Y., Patterson—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating Main Street Crossing, Putnam Co. $95,400.

N. Y., Plattekill—New York, New Haven & Hartford R.R. Co., R. L. Pearson, ch. engr., New Haven, Conn., eliminating Plattekill crossing of railroad, Ulster Co. $112,000.

N. Y., Riga — New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, reconstructing hy. bridge to carry Buffalo Hy. over railroad about 2 mi. east of Churchville, Monroe Co. $193,045.

N. Y., Seneca Falls—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating Dumonts Crossing, Seneca Co. $114,200.

N. Y., West Seneca—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., eliminating Union Road Crossing, Erie Co. $294,668.

Pa., Norristown — Montgomery Co., W. D. Ridgeway, pres., Pennsylvania R.R. Co., Broad St. Sta., 1617 Pennsylvania Blvd., Phila., T. J. Skillman, ch. engr., and Philadelphia & Reading R.R. Co., Reading, Terminal Bldg., Phila., C. Dillenbeck, ch. engr., preliminary plans Washington St. grade crossings, Lafayette St. grade crossing, bridges over De Kalb and Mills Sts., changes in alignment grades, grading, paving, sewers.

Tex., Amarillo—Potter Co., c/o S. B. Motlow, judge, 0.152 mi. concrete, steel underpass, under Chicago, Rock Island & Gulf and Fort Worth and Denver Ry. on Fillmore St. from South 1st to North 2nd Sts.

Tex., Marshall—City and Texas & Pacific Ry. Co., F. F. Mitchell, ch. engr., Dallas, soon take bids steel, concrete viaduct over North Grove St. $30,000.

Tex., Fort Worth—City, c/o O. E. Carr, mgr., and Missouri, Kansas & Texas R.R., c/o Z. G. Hopkins, Ft. Ringer, ch. engr., St. Louis, Mo., soon takes bids steel, rein.-con. underpass under railroad tracks. $145,000.

CONTRACTS AWARDED

N. J., Perth Amboy—Bd. City Comrs., City Hall, concrete, steel undercrossing under Central R.R. connecting Alpine, Keene and Grove Sts. with Pulaski Ave. and Katherine St., to A. Christensen, 80 Broad St., Elizabeth.

N. Y., Avoca — Delaware, Lackawanna & Western R.R. Co., G. J. Ray, ch. engr., Hoboken, N. J., eliminating Bath-Avoca Hy. Crossing, Steuben Co., to E. P. Muntz, Lehigh Valley Terminal Bldg., Buffalo, $63,247. Est. $155,322. Noted Sept. 11.

N. Y., Van Etten—Lehigh Valley R.R. Co., G. T. Hand, ch. engr., 142 Liberty St., New York, eliminating grade crossings in town and village, to Bolton, Suits, Bolton & Gibbs, Watkins Glen, $19,173. Est. $32,491. Noted July 18.

DAMS

PROPOSED WORK

Calif., Los Angeles—See "Waterworks."

CONTRACTS AWARDED

Calif., Irvine—See "Waterworks."

PIERS AND WHARVES

PROPOSED WORK

Mass., Tisbury—WHARF, etc.—Texas Co., Park Sq. Bldg., Boston, soon takes bids wharf, bulkhead, retaining walls and office. $40,000. Private plans.

BIDS ASKED

La., New Orleans—SHED—Jan. 13, by Dock Bd., furnishing, erecting structural steel framing for shed at Mandeville Street Wharf, incl. 530 tons steel.

CONTRACTS AWARDED

Mass., Marion—PIER, etc.—E. Ryerson, Jr., Converse Point, timber pier, bulkhead, rip rap, superintendent's office, to T. Oglesby, Front St. Est. $35,000.

AIRPORTS

PROPOSED WORK

Ill., Decatur—City Air Port Comn., c/o W. J. Carey, Millikin Bldg., airport. $75,000. Architect not selected. **Maturity probably in spring.**

Mass., Leominster—Fitchburg Leominster Airport Corp., airport, incl. relocating Crawford St. hangar, machine shop, lunch room and offices. $75,000. Private plans.

Tex., Galveston—City soon takes bids airport, incl. steel hangars, repair shop with equipment, runways, other necessary equipment for complete field. $90,000. J. W. Beretta Engineers, Inc., Natl. Bank of Commerce Bldg., San Antonio, engrs. and archts. Noted Dec. 4.

Tex., Beaumont—City, c/o P. Millard, mgr., plans by Irby & Woodside, archts. and engrs., Goodhue Bldg., airport plant, incl. repair shop building, steel hangars, runways, landing field put in shape. $75,000. Noted Sept. 4.

Vt., Bennington—Town, E. A. Booth, Town Hall, airport. $25,000 or more. Engineer not selected.

B. C., Vancouver—City Council, improvements to airport. $100,000.

BIDS ASKED

N. Y., Brooklyn—Jan. 12, by M. Cosgrove, comr. Docks, Pier "A," constructing, erecting administration building at Municipal Airport (Floyd Bennett Field), Flatbush Ave. Former bids rejected. Noted Dec. 11.

CONTRACTS AWARDED

Ala., Birmingham—A. J. Hawkins, city engr., general contract large hangar, and a terminal or administration building, to Honeycutt Constr. Co., Martin Bldg., $35,363 and $53,141 respectively; plumbing and heating, to Heck Plumbing & Heating Co., 915 South 18th St., $17,320; hangar doors, to Detroit Steel Products Co., 2431 1st Ave. S., $7,650; pump motor housing and installing electrical sewerage system, to J. B. McCrary, 816 Howard St., New Orleans, La., $1,335; sanitary sewers, to Richardson Trading Co., $2,516; lighting, to O'Keefe & Lyons Electric Co., 1700 5th Ave. N., $9,000. Grand total $126,655. Noted Dec. 18.

POWER AND LIGHTING

PROPOSED WORK

N. Y., Esopus—Central Hudson Gas & Electric Corp., South Rd., Poughkeepsie, gas plant extensions, incl. high pressure transmission line. $33,940.

Tex., San Antonio—San Antonio Pub. Serv. Co., 201 North St. Mary's St., extending cables and pole lines, incl. new districts, replacements. $150,000. Private plans.

Utah, Salt Lake City—Ornamental lighting system on South Main St. from 5th South St. to Herbert Ave., incl. one hundred fifty-two 1,500 cp. incandescent light units, wiring system. $14,000. H. Jessen, city engr.

BIDS ASKED

N. Y., Brooklyn—See "Contracts Awarded."

Wash., Seattle—Jan. 16, by Bd. P. Wks., G. W. Roberge, secy., 125 mi. transmission line conductor and accessories to carry 150,000 kva., 60 cycle, 3 phase, to connect Diablo plant of Skagit River Development, Whatcom Co. with south sub-station, here. $800,000. Noted Jan. 1.

CONTRACTS AWARDED

Ind., Indianapolis—See "Unclassified."

New Jersey—Jersey Central Power & Light Co., Broad St., Red Bank, general contract 14 steel towers, 80 to 110 ft. high, to carry main power lines from plants at Red Bank, Lakewood and South Amboy, to S. S. Thompson Co., Inc., 190 Monmouth St., Red Bank. Est. $40,000.

N. Y., Brooklyn—Brooklyn Edison Co., 380 Pearl St., will convert 171 mi. overhead lines to underground in Greenpoint, Evergreen, Bushwick, Ocean Parkway, East New York, and Park Slope Sections, $7,394,000, also improving distribution systems, $2,000,000, day labor and separate contracts.

N. Y., New York—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., telephone and emergency alarm equipment for portion Independent System City-owned Rapid Transit R.R., to Cleveland & Ryan, Inc., 175 5th Ave., $379,554. Noted Nov. 23.

N. Y., Yonkers—See "Power Plants."

SPORTS AND PARKS

PROPOSED WORK

Calif., Pomona—Los Angeles Co. (Los Angeles), plans by K. Muck, co. archt., Hall of Records, steel, concrete grandstand, 10,000 seating capacity, County Fair site.

Ill., Jacksonville—State of Illinois, Capitol Bldg., Springfield, H. Hammond, superv., plans by State Division of Architects & Engineers, Capitol Bldg., Springfield, brick, concrete swimming pool, bath house, lockers, at Illinois State School for Deaf. $40,000.

Ia., Spencer—Clay Co. Fair Assn. concrete grandstand for county fair grounds. $40,000. Allen & Vagtborg, 205 West Wacker Dr., Chicago, Ill., engrs.

Mass., East Boston (sta. Boston)—City, Park Dpt., improving H. L. Noyes Playground. $75,000 appropriated. Noted May 15.

Mass., Quincy—City, T. McGrath, mayor, City Hall, stadium, probably concrete, northern artery. $100,000. Engineer not selected.

N. Y., Brooklyn—Dpt. Parks, W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, sketches by H. G. Harrington, 311 106th St., menagerie, cages, etc. Prospect Park. $50,000.

O., Cleveland—Bd. Educ., F. G. Hogen, dir., sketches by G. M. Hopkinson, Auditorium Garage Bldg., concrete, steel grand stand, field house and athletic field, 840 East 118th St. $50,000.

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Sports and Parks (Continued)

CONTRACTS AWARDED

Conn., New Haven—City, Park Dpt., general contract (1st unit) rein.-con., brick, bathhouse at Lighthouse Point, to F. J. Smith, 254 Main St., Derby, $21,650. Est. exceeds $25,000. Noted Dec. 25.

Mass., Manchester — G. Putnam, Manchester Point, concrete swimming pool, Manchester Point, to Connolly Bros., Oat St., Beverly Farms. Est. $25,000. Noted Dec. 18.

O., Cleveland—City, grand stand seating for Lakefront Stadium, to Theodore Kundtz Co., Elm and Winslow Sts., $170,458. Noted Nov. 13.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, repairing public bath, Montrose Ave., to L. Supran, 1712 Towsend Ave., New York, $62,200. Noted Dec. 4.

N. Y., Brooklyn—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, repairing Fort Hamilton Parkway, to M. J. O'Hara, Neptune Ave. and West 19th St., $53,825; repairing and constructing picket fence, Prospect Park Wall, to Burr Nie Constr. Co., $3,760; general contract garage, Prospect Park, to Ocram Holding Co., 2067 Bway., New York, $14,890, plumbing, to Frisse & Bro., Inc., 669 Bushwick Ave., $770, heating, to L. Bigolet, 28 Oliver St., New York, $970. Grand total $74,215. Noted Dec. 11.

N. Y., Long Island City—Dpt. Parks, W. R. Herrick, pres. Park Bd., Adsenal Bldg., Central Park, New York, grading, asphalt paving Forest Parkway, to Pomonok Asphalt Paving & Material Co., 1246 Grand St., Brooklyn, $20,454. Noted Dec. 18.

N. Y., New York—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, grading Rice Memorial Playground, to Road Eng. & Constr. Co., 341 Madison Ave., $17,500. Noted Dec. 11.

N. Y., Rochester—City, Seneca Park Zoo, to Stewart & Bennett, Inc., 126 North Water St., $91,400; plumbing, to Howe & Bassett, 840 University Ave., $5,987; heating, to F. W. Murtagh, 16 Howell St., $7,983.

HEATING AND VENTILATING

PROPOSED WORK

La., New Orleans—Charity Hospital, 1532 Tulane St., heating system for nurse's home, $12,500. F. H. Chisolm, 622 South Peters St., engr.

N. Y., Dongan Hills (mail Staten Island)—Dpt. Hospitals, Municipal Bldg., New York, mechanical equipment at isolation pavilion, corridors, etc. at Seaview Hospital, $80,000. Sibley & Fetherston, 205 East 42nd St., New York, archts.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., mechanical equipment, New York City Home, Welfare Island, $50,000. Van Wart & Wein, 347 Madison Ave., archts.

CONTRACTS AWARDED

Conn., Middletown—City, heating and plumbing in Junior and Senior High School, to Brown Bros., 174 Main St. Est. $25,000. Noted Nov. 13, under "Schools."

N. Y., Long Island City — Bd. Educ., 500 Park Ave., New York, heating for P. S. 150, to H. Starkman Bros., 132 Brook Ave., New York, $77,880; plumbing, to G. D. Casper, 204 Jackson Ave., $28,915; electrical work, to Pyramid Electric Co., 228 East 41st St., New York, $24,370. Grand total $131,165. Noted Nov. 6.

N. Y., Pelham Manor—Huguenot Memorial Church, heating, ventilating in community house, to H. F. Raab, 48 Lake St., White Plains. Est. $25,000. Noted Oct. 9, under "Buildings-Unclassified."

UNCLASSIFIED

PROPOSED WORK

Mass., Boston—CAGE GARAGES—Owner, c/o S. Elliot, trustee, 131 State St., sketches by G. E. Robinson, 80 Federal St., several rein.-con. cage (part open, no windows) garages in various sections Boston Proper, 200 to 800 car capacity.

Mass., Lynn—COMFORT STATION—City, D. Dinneen, supt. Pub. Property, comfort station, probably concrete, Central Sq. $25,000 or more.

Mass., Newton — GAS HOLDER, METER HOUSE, etc. — Boston Consolidated Gas Co., 250 Stuart St., Boston, gas holder, meter house, grade crossing Grove St. $25,000. Private plans.

Mass., Oak Bluffs—COMFORT STATION—Town, J. Billings, chn. Bd. Health, 1 story, concrete comfort station.

Mass., Westport — GREENHOUSE—Have-a-Look Gardens, Inc., H. F. Grinnell, pres., rebuilding greenhouse, Pine Hill Rd. $25,000. Engineer not selected.

N. Y., Brooklyn—COMFORT STATION—Dpt. Parks, W. R. Herrick, pres. Park Bd., Central Park, New York, sketches by J. S. Kennedy, 157 Remsen St., comfort station, Bay Parkway and West 8th St. $40,000.

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N. Y., Brooklyn—COMFORT STATION—Dpt. Parks, W. R. Herrick, comr. Park Bd., Arsenal Bldg., Central Park, New York, soon takes bids comfort station, Ocean and Parkside Aves. $40,000. J. S. Kennedy, 157 Remsen St., archt.

N. Y., Brooklyn — EMERGENCY DEPARTMENT, etc.—Dpt. Hospitals, Municipal Bldg., New York, emergency department, refrigeration plant, incinerator and equipment at Coney Island Hospital, Ocean Blvd. G. M. McCabe, 96 5th Ave., New York, archt.

N. Y., Dongan Hills—GLASS ENCLOSURES—Dpt. Hospitals, Municipal Bldg., New York, vita glass enclosures at Sea View Hospital. $50,000. M. Bernstein, 2 Columbus Circle, New York, archt.

N. Y., Jamaica—PLUMBING, etc.—Dpt. Hospitals, J. G. W. Greef, comr. Municipal Bldg., New York, rejected bids Dec. 12, plumbing and electrical work for Queens General Hospital. Noted Dec. 11, under "Hospitals."

N. Y., New York—REFRIGERATION—Ruspyn Corp., P. P. Pogne, pres., 50 East 42nd St., refrigeration unit, washrooms, mechanical equipment for theatre. $40,000. T. W. Lamb, 644 8th Ave., archt.

Okla., Antlers—GAS SYSTEM—Southern Gas Co., Hugo, preliminary plans natural gas distribution system. $30,000. Private plans.

Okla., Buffalo—GAS SYSTEM—Buffalo Pub. Serv. Co. did not hold franchise election Nov. 12, but will probably vote on proposal to grant franchise to State Fuel Co. early this year for natural gas system. E. F. Camp, mayor. Noted Oct. 30.

Okla., Laverne—GAS SYSTEM—State Fuel Supply Co., Trades Natl. Bldg., Oklahoma City, granted franchise natural gas distribution system. $30,000. Private plans.

Pa., Baden—RIVER RAIL TERMINAL—W. D. Wiggins, ch. engr. (Central Region) Pennsylvania R.R. Co., Pennsylvania Sta., Pittsburgh, soon takes bids general contract and mechanical equipment rail river terminal on Ohio River. $350,000. Noted Dec. 4.

Texas — LAND DEVELOPMENT — H. M. Munger, Linz Bldg., Dallas, purchased 22,000 acre tract in Zavalla Co. and plans developing same.

Tex., Beaumont—RESORT DEVELOPMENT—O. B. Sawyer, Grand and Long Sts., developing 962 acre tract, incl. constructing artificial lake, installing hydraulic turbine, and electric plant, lodge, etc. A. Babin, Perlstein Bldg., engr.

Tex., San Antonio—GAS PIPE LINES—San Antonio Pub. Serv. Co., 201 North St. Marys St., additional mains for natural gas distributing system, incl. replacements where needed, extensions into outlying districts. $300,000. Probably purchase pipe and use own forces in laying of same.

Canada—TELEPHONE EXTENSIONS—Bell Telephone Co. of Canada, Toronto, Ont., C. F. Sise, pres., expending $20,000,000 during 1931, for extensions, improvements, incl. Central office equipment, $5,700,000, long distance outside plant $2,695,000, exchange lines $4,260,000, land and buildings $1,000,000, subscribers station equipment $5,850,000, rebuilding line between Montreal, Que., and Toronto, Ont., $660,000, also new line between Charney, near Quebec Que., to Riviere du Loup, which will be part of the new trans-Canada line from coast to coast.

BIDS ASKED

Mass., Waltham — BOILERS — Jan. 13, by Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, additional boilers for Metropolitan State Hospital.

N. Y., Brooklyn—FIRE PREVENTION—Jan. 12, by J. G. W. Greeff, comr. Dpt. Hospitals, Municipal Bldg., New York, altering and additions for fire prevention to main building, at Kings County Hospital, Clarkson Ave. between New York and Albany Aves.

Texas — NATURAL GAS PIPE LINE — See "Contracts Awarded."

CONTRACTS AWARDED

Ind., Indianapolis — AVIATION LIGHT and TOWER—Lincoln Oil Co., Robinson, Ill., 2,000,000 candle power beacon aviation light on top Merchants National Bank Bldg., tower for light will be 107 ft. high, 18 ft. arrow will point to Municipal Airport, to General Outdoor Advertising Co., 121 West Maryland St., $55,000.

La., New Orleans—SPRINKLER SYSTEM—Bd. Comrs. Port of New Orleans, New Orleans Court Bldg., furnishing, installing sprinkler system requiring 300 mi. pipe along 34 wharves, to F. R. Cruikshank & Co., 220 East 42nd St., New York, $1,250,000. Noted Oct. 30.

N. Y., Long Island City—STATION FINISH—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, station finish work, Queens Plaza, 36th, Steinway and 46th St. Stations of Rapid Transit R.R., to Court Constr. Co., 2 Lafayette St., New York, $337,362. Noted Oct. 23.

Okla., Okmulgee—PUMPING STATION—Great Lakes Pipe Line Co., Ponca City, pumping station, near here, to J. W. Whitehurst, Ponca City, $128,000. Est. $150,000. Noted Dec. 18.

Texas—NATURAL GAS PIPE LINE—Oklahoma Natural Gas Co., 62 South Boston St., Tulsa, Okla., and c/o E. R. Bradbury, local mgr., San Angelo, Tex., constructing 40 mi. 8 in. c.i. welded pipe line from Texon to Red Pecos and 60 mi. 12 in. c.i. pipe line from Texon to San Angelo, day labor. $3,000,000. Private plans.

Utah and Idaho — GAS PIPE LINE — Wasatch Gas Co., L. Fitzpatrick, vice-pres., 45 Main St., Salt Lake City, natural gas pipe line from Ogden, Utah to Pocatello, Idaho, $3,200,000. Work will be done by contract for fabricating and distributing pipe, and day labor for trenching and installing pipe, accessories. Work starts immediately.

N. B., St. John—TRANSIT SHED—Harbor Comrs., 1 story, 800 x 900 ft. timber transit shed, to Ashley A. Colter, Fredericton, $155,000.

MATERIALS

BIDS ASKED

TAR—**Trenton, N. J.**—Jan. 13, by Bd. Freeholders Mercer Co., Court House, 50,000 gal. tar for cold application, Grades RP or UC for roads. H. F. Harris, Trenton, co. engr.

PORTLAND CEMENT, etc. — **Long Island City, N. Y.**—Jan. 12, by G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., 3,000 bags portland cement; 7,000 cu.yd. earthwork; 100,000 asphalt paving blocks; 300,000 gal. fuel oil.

METALS, etc.—**New York, N. Y.**—Jan. 14, by P. J. Dooling, comr. Plant & Structures, Municipal Bldg., metals and castings to Dpt. Water Supply, Gas & Electricity.

WHEELS, TUBES, PIPE, etc.—**Phila., Pa.**—Jan. 13, by C. E. Walsh, purch. agt. Pennsylvania R.R. Co., 15 North 32nd St., axles, steel wheels, steel sheets, boiler tubes, steel pipe. Contrs. 35 to 39 (inclusive)-1930.

CASINGS and TUBES—**Spokane, Wash.**—Jan. 15, by C. T. Bogart, city purch. agt., pneumatic casings and tubes for year 1931.

CONTRACTS AWARDED

PIPE and FITTINGS—**El Monte, Calif.**—City Council, 1,900 ft. 6 in. c.i. pipe, miscellaneous fittings, to United States Pipe & Fdry. Co., 2326 East 8th St., Los Angeles, at $0.563 per ft.

STEEL GUY CABLE—**Los Angeles, Calif.**—City Purchasing Agent, 450,000 ft. $\frac{1}{2}$ in. and 300,000 ft. $\frac{5}{8}$ in. standard galvanized guy cable, 165,000 ft. $\frac{1}{2}$ in. Siemans-Martin galvanized steel guy cable, 25,000 ft. $\frac{7}{8}$ in. extra high strength galvanized guy cable, to Pacific Wire Rope Co., 1840 East 15th St., $12,377. Noted Dec. 18.

CAST IRON REQUIREMENTS — **Hartford, Conn.** — City, Bd. Contr. & Supply, 450 pcs. various manhole, catch basin, curb section, grates, etc., to P. Laragy, 114 Grove St., $5,647. Est. $5,000.

BITUMINOUS PATCHING MATERIAL—**Boston, Mass.** — City, Supply Dpt., furnishing bituminous patching material as specified, to Trimount Oil Co., 1840 Parkway, Everett, $6,790. Noted Dec. 4.

COMPOSITION CASTINGS—**Boston, Mass.**—City, Supply Dpt., P. A. Chapman, supt., furnishing composition castings as specified, to Gibby Fdry. Co., 92 Condor St., East Boston, $8,230. Noted Dec. 4.

IRON CASTINGS, etc. — **Boston, Mass.** — Supply Dpt., 100,000 lb. iron castings to Water Service, to Gibby Fdry. Co., 96 Condor St., East Boston, $2,690; 200,000 lb. frames and covers, and 200,000 lb. pipe stock, to Le Baron Fdry. Co., Brockton, $13,600; 350,000 lb. gate and hydrant castings, to Mechanics Iron Fdry. Co., 38 Kemble St., Roxbury, $14,700; 400,000 lb. iron castings, branches, curves, to Johnson City Fdry. & Machine Co., 150 Nassau St., New York, $15,600. Grand total $46,590. Noted Dec. 25.

TWO-PART BOXES, etc.—**Boston, Mass.**—City, Supply Dpt., furnishing 400,000 lb. two-part boxes, to Central Fdry. Co., 420 Lexington Ave., New York, $12,000; c.i. water pipe as specified, and c.i. water pipe for high pressure service as specified, to Warren Fdry. & Pipe Co., 75 Federal St., $90,375 and $43 per ton respectively; special castings for high pressure service as specified, to D. H. Walton & Co., Inc., 1775 Bway., New York, at $140 per ton. Noted Dec. 4 and Nov. 27.

CAST IRON PIPE — **Marblehead, Mass.** — Town, Water Comn., furnishing, delivering c.i. pipe and special castings as specified, to United States Pipe & Fdry. Co., Morris Bldg., Phila., Pa. Est. exceeds $5,000. Noted Oct. 23.

CAST IRON PIPE, etc.—**Salem, Mass.**—City, furnishing c.i. pipe as specified, to Warren Fdry. & Pipe Co., 75 Federal St., Boston, at $41 per ton; valves, to Chapman Valve Mfg. Co., 71 A St., South Boston, 12 in. at $65 each, 8 in. $34.30, 6 in. $21.75.

CEMENT—**New Brunswick, N. J.**—Middlesex Co., Court House, 11,000 bags Edison portland cement, to P. M. Welsh, New Brunswick, $6,600.

ASPHALT CEMENT—**Brooklyn, N. Y.**—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, 200,000 gal. asphalt cement, to Standard Oil Co., 230 Park Ave., New York, $9,500; 5,000 cu.yd. asphalt sand, to M. F. Hickey, foot 6th St., $4,450; 1,000 net tons limestone dust and 2,000 cu.yd. binder stone, to New York Trap Rock Co., 250 Park Ave., New York, $6,250

Materials (Continued)

and $3,860 respectively. Grand total $24,060. Noted Dec. 4.

CAST IRON PIPE—El Paso, Tex.—City, c/o G. B. Davis, purch. agt., 5,100 ft. 20 in. c.i. bell and spigot centrifugal pipe, to American Cast Iron Pipe Co., El Paso, at $3.54 per ft., total $18,054; 300 ft. 20 in. bell and spigot Class B pipe, to Colorado Fuel & Iron Co., Boston B, Denver, Colo., at $3.99 per ft., total $1,198. Noted Dec. 4.

WATER PIPE — Milwaukee, Wis. — Central Bd. Purchases, J. W. Nicholson, purch. agt., 6,000 tons 6- to 16-in. Class C water pipe, to United States Pipe & Fdry. Co., 760 East Pearl St., Burlington, N. J., at $41 per ton, total $246,000; 600 fire hydrants, to R. D. Wood Co., 400 Chestnut St., Phila., Pa., at $51.25, total $30,750. Noted Dec. 18.

EQUIPMENT

PROPOSED WORK

ENGINE and GENERATOR—Norwich, Conn.—State, Norwich State Hospital, purchasing engine and generator for power plant at State Hospital. $25,000.

GRADERS—Galesburg, Ill.—Knox County Hy. Dpt., purchasing one or two 12 ft. graders. A. R. Smith, Galesburg, supt. hys.

STEAM TURBINE — Independence, Mo. — City plans steam turbine for power plant, $25,000. Black & Veatch, 700 Mutual Bldg., Kansas City, engrs.

WATERWORKS EQUIPMENT — Greensburg, Pa. — Westmoreland Water Co., Pennsylvania Ave., M. W. Crownover, mgr., purchasing waterworks equipment for clear well and mixing chamber buildings, at South Greensburg.

BIDS ASKED

DIESEL ENGINE GENERATING UNIT — Gridley, Calif.—Jan. 12, by J. L. Lewis, city clk., Diesel engine generating unit with pumps, meters, equipment and materials.

DRAG-LINE BUCKET — Medford, Mass. — W. B. C. Co., 397 Riverside Ave., in market 20 or 24 in. conveyor belt drag-line bucket.

TRENCH DIGGER—Stoneham, Mass.—W. C. Doherty, 52 Summer St., in market trench digger, ladder type.

TRUCK—Albert Lea, Minn.—Jan. 12, by City, C. C. Ludwig, mgr., dump truck with 1½ yd. hand hoist.

GASOLENE SHOVEL—Reno, Nev.—Jan. 16, by Bd. Comrs. Washoe Co., c/o County Clerk, ¾ cu.yd. full swing gasolene shovel.

TRAILER, etc.—Long Island City, N. Y.—Jan. 12, by G. U. Harvey, pres. Queens Boro. Queens Subway Bldg., 1 highway trailer, 1 mechanical spreader, 3 gasoline rollers, 4 tractors, 6 motor patrol graders.

CONTRACTS AWARDED

TRACTORS—San Angelo, Tex.—Tom Green Co., c/o J. T. Mathison, judge, furnishing two No. 10 and one No. 12 graders, to J. D. Adams Co., San Angelo, $4,000; two 30 in. caterpillar tractors, to B. B. George Mchy. Co., San Angelo, $5,398. Noted Dec. 4.

Buildings

RESIDENTIAL

BIDS ASKED

Calif., San Mateo—See "Contracts Awarded."

Mass., Boston—Owner, c/o G. R. Grantham, trustee, 44 School St., taking bids 11 story, basement, 30 x 110 ft., brick, limestone, rein.-con., steel hotel addition, plain found., Beacon St. To exceed $150,000. W. W. Dinsmoor, 8 Beacon St., archt. Noted Nov. 27.

Mass., Malden (br. Boston)—See "Contracts Awarded."

N. J., Jersey City—F. G. Hasselman & A. J. Zerman, archts., 34 Prospect St., East Orange, taking bids on separate contracts 12 story, basement, brick, steel, Hudson Blvd. and Gifford Ave., for Gifford Realty Co., c/o architect. Former bids rejected. $450,000. Noted Dec. 4.

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

N. Y., New York—Two Fifth Avenue Corp. bids about Feb. 1, general and separate contracts apartment, West 8th St. and 5th Ave. $5,000,000. Walker & Gillette, 599 Madison Ave., archts. Noted Nov. 20.

N. Y., New York—W. A. R. Realty Co., 2 Columbus Circle, soon takes bids apartment, hotel, store, 958 6th Ave. $4,000,000. **Maturity in summer or later.** G. B. Post, 101 Park Ave., New York, archt. Noted May 1.

CONTRACTS AWARDED

Calif., Alameda — J. S. Bercovich, Actico Bldg., Oakland, 7 story, basement, rein.-con., steel, to G. P. W. Jensen, 320 Market St., San Francisco, $300,000. Noted Oct. 23.

Calif., Los Angeles—W. G. Bentley, 7 story, basement, rein.-con. Class A South Gramercy Pl., to Harris Bowers Constr. Co., I. W. Hellman Bldg., $225,000.

Calif., Oakland—Owner, c/o C. N. Burrell, archt., Amer. Bank Bldg., 6 story, basement, steel, concrete hotel, 40th St. and San Pablo Ave., to Dyer Constr. Co., Ray Bldg., Oakland, $175,000.

Calif., San Mateo—I. Downing, 212 South El Camino St., 6 story, basement, brick, steel, concrete, 3rd and Dartmouth Sts., separate contracts under supervision W. Lowe, archt., 354 Hobart St., Oakland. $250,000.

Mass., Cambridge—J. A. Carrig, 1774 Mass Ave., 4 story, basement, 80 x 125 ft., brick, steel, stone, plain found., 334 Harvard St., separate contracts. $160,000. H. Harlow, 4 Brattle St., archt.

Mass., Malden (br. Boston)—F. Spring, 876 Main St., 4 story, basement, brick, stone, steel, plain found., 213 Main St., day labor. $150,000. C. F. Springall, 50 Park St., archt.

N. Y., Brooklyn—Belford Constr. Corp., D. Minkin, secy., 16 Court St., 6 story, 84 x 150 ft., Albemarle Rd. and East 19th St., separate contracts. $200,000. Cohn Bros., 215 Montague St., archt.

N. Y., Brooklyn—Filmore Associates, 136 Lawrence St., 6 story, 150 x 213 ft., Linden Blvd. and East Nostrand Ave., separate contracts. $650,000. W. T. McCarthy, 147 Pierrepont St., archt.

N. Y., Brooklyn—Fishkind Homes, 1415 46th St., 6 story, 84 x 100 ft., East 19th St. and Quentin Rd., separate contracts. $165,000. S. L. Malkind, 93 Court St., archt.

N. Y., Brooklyn—Fulton Highland Co., 1830 61st St., 4 story, 90 x 105 ft., Cypress Ave. and Stockholm St., separate contracts. $150,000. Seelig & Finkelstein, 153 Pierrepont St., archts.

N. Y., Brooklyn—Mira Holding Corp., 1559 East 5th St., 6 story, 88 x 100 ft., West 10th St. and Avenue P, separate contracts. $150,000. M. Hirsch, 350 Stone St., archt.

N. Y., Brooklyn—One Hundred East 19th Street Corp., c/o D. Goldstein, 16 Court St., 6 story, 146 x 200 ft. Albermarle Rd. and East 19th St., separate contracts. $650,000. W. T. McCarthy, 147 Pierrepont St., archt.

N. Y., New York — Corporation, c/o J. Felson, archt., 250 West 57th St., 16 story, 80 x 100 ft. apartment, 115 West 86th St., separate contracts. $150,000. Noted Apr. 10.

N. Y., New York—Enjay Holding Corp., 17 East 22nd St., 18 story, 175 x 182 ft., separate contracts. $2,000,000. J. M. Felson, 250 West 57th St., archt. Noted Apr. 24.

N. Y., Long Island City—Foster Madden Corp. 1 East 44th St., New York, 6 story, 85 x 180 ft., 43rd Ave. and 41st St., separate contracts. $300,000. A. Farber, c/o owner, archt.

CLUBS

PROPOSED WORK

N. Y., New York—Amer. University Club, 40 story club, $8,000,000. **Maturity in fall.** Bottomley, Wagner & White, 60 East 42nd St., archts. Noted Aug. 21.

BIDS ASKED

N. Y., New York—Jan. 14, by Railroad Y. M. C. A., National Bureau Y. M. C. A., 347 Madison Ave., general contract club, 220 East 47th St. $2,000,000. Warren & Wetmore, 16 East 47th St., archts. Noted Dec. 18.

N. J., Weehawken—W. Mahnken, archt., 401 32nd St., Union City, bids about Apr. 1, general contract 3 story, basement club house addition, Boulevard E. and 6th St., for B.P.O.E., 2 6th St. $150,000. F. J. Ricker, 685 Hudson Ave., West New York, archt. Noted Dec. 4.

CONTRACTS AWARDED

Conn., New Haven—Yale University, T. Farnum, constr. supt., 4 story, basement, stone, concrete Yale Y.M.C.A., to Dwight Building Co., 67 Church St. Est. $400,000.

HOSPITALS

PROPOSED WORK

Conn., Waterbury—St. Mary's Hospital, c/o L. A. Walsh, archt., 51 Leavenworth St., Children's unit, 4 story, basement, 40 x 135 ft., brick, stone, Franklin, Cole and Scoville Sts. $175,000. Bid date indefinite. Noted June 5.

Conn., Willimantic—St. Joseph's Hospital, 88 Jackson St., J. F. Carr, pres. trustees, bids late in spring, hospital. Crow, Lewis & Wick, 200 5th Ave., New York. Noted Dec. 4.

Mass., Boston — City, Institutions Dpt., recreation building at Long Island Hospital. $200,000. Architect not selected.

N. J., Jersey City—Bd. City Comrs., K. Wasser, city clk., Court House, plans by J. T. Rowland, Jr., 30 Journal Sq., 15 story, basement, psychopathic hospital, brick, steel, rein.-con., plain found., Baldwin and Montgomery Sts. $150,000.

Neb., North Platte—Great Plains Hospital Assn., plans by C. C. Coursey, 4 Watermath Bldg., 4 story, basement, 120 x 155 ft., brick hospital. $150,000.

N. Y., Brooklyn—Dpt. Hospitals, Municipal Bldg., New York, plans by Dodge & Morrison, 160 Pearl St., New York, hospital extension, at Coney Island Hospital, Ocean Parkway. $150,000.

N. Y., Dongan Hills—Sea View Hospital plans by A. Martin, 34 West 28th St., New York, childrens hospital building, on premises. $600,000.

N. Y., New York—Beth Isreal Hospital and Jewish Maternity Hospital, S. Singer, pres., 475 5th Ave., bids late in May, general contract hospital, 17th St. near 2nd Ave. $1,000,000. C. B. Meyers, 31 Union Sq., archt. Noted Sept. 25.

N. Y., New York — Committee, c/o Consul General of Greece, 63 Park Row, hospital, $400,000. **Maturity in December.** Noted Nov. 28, 1929.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., plans by Schwartz & Gross, 347 5th Ave., nurses home addition, Welfare Island. $500,000.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., plans by M. Bernstein, 2 Columbus Circle, male dormitory, $325,000, and mechanical equipment in Neurological Dpt., $30,000 both for Metropolitan Hospital, Welfare Island.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., plans by B. R. Swartburg, 2 West 40th St., extending nurses home at Fordham Hospital, Southern Blvd. $150,000.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., bids after Feb. 1, general contract nurses home for Harlem Hospital, 72 West 136th St. $700,000. Sloan & Robertson, 420 Lexington Ave., archt. Noted Dec. 4.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., soon takes bids general contract altering Lincoln Hospital, 142nd St. and Concord Ave. $345,000. C. B. Myers, 31 Union Sq., archt. Noted Feb. 27, 1930.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., bids after Feb. 1, general contract 7 story, 196 x 238 ft. woman's pavilion, at Harlem Hospital, 22-44 West 137th St. $1,550,000. Sloan & Robertson, 420 Lexington Ave., archts. Noted Nov. 20.

N. Y., New York — Gotham Hospital, 17 East 42nd St., bids in April or later 9 story hospital, nurses' home power unit. $3,000,000. G. Atterbury, 139 East 53rd St., archt. Noted Sept. 25.

N. Y., New York—Italian Benevolent Institute, 22 East 42nd St., bids early in spring, general contract 9 story nurses home and training school, $1,000,000. De Pace & Juster, 151 West 46th St., archts. Knopf & Storch, 17 West 44th St., structural engrs. D. Moray & Wallen, 101 Park Ave., mechanical engrs. Noted Oct. 2.

Pa., Mercer—Bd. Comrs. Mercer Co., E. J. Jones, clk., Court House, sketches by Owsley Co., 606 Home Savings & Loan Co., Youngstown, O., 2 story, basement, brick, hollow tile tuberculosis hospital. $250,000. **Maturity in 2 years.**

Wis., Milwaukee—Milwaukee Hospital, 2200 Kilbourn Ave., plans by Clas & Clas, 445 Milwaukee St., 6 story, basement, brick, steel addition. $400,000.

Ont., London—Parkwood Hospital Bd., B. F. Brighton, chn., bids latter part March, 2 story, 50 x 200 ft. wing, Grand Ave. $150,000. J. M. Moore & Co., 489 Richmond St., London, archts.

BIDS ASKED

Ind., Indianapolis—Bd. Comrs. Central Insane Hospital, 3000 West Washington St., Bids about Feb. 1, rein.-con., brick hospital. $150,000. McGuire & Shook, 941 North Meridian St., archts. Bevington & Williams, K. of P. Bldg., engrs. Noted Oct. 23.

Ind., Indianapolis — Riley Hospital, West Michigan St., bids about Feb. 1, 2 story, basement, 75 x 150 ft., rein.-con., brick, stone rotarian unit to hospital. $200,000. R. F. Daggett, 922 Continental Bldg., archt. Noted Dec. 4.

Mass., Barnstable—Cape Cod Hospital, Inc., C. L. Ayling, Hyannis, taking bids altering and constructing 3 story, basement, brick, stone hospital addition, plain found., Park St. $150,000. Shepard & Stearns, 53 State St., Boston, archts. Noted Sept. 18.

N. Y., New York—Bronx Maternity Hospital, 1072 Grand Concourse, taking bids to be due sometime in February general contract hospital, 1072 Grand Concourse, B. H. Whinston, 6 East 46th St., archt. Noted Dec. 11.

CONTRACTS AWARDED

D. C., Wash.—District Comrs., District Bldg., nurses' home at Gallinger Hospital, to W. C. Rose Co., Goldsboro, N. C., $311,120. Noted Dec. 11.

N. Y., Jamaica—Dpt. Hospitals, J. G. W. Greef, comr., Municipal Bldg., New York, general contract Buildings A, B, C, E, F, G, H and connecting tunnels at Queens General Hospital, to J. Kennedy & Co., 1133 Bway., New York, $2,234,800; heating, to Raisler Heating Co., 129 Amsterdam Ave., New York, $469,000. Noted Dec. 11.

Sask., Saskatoon—Bd. Control of City Hospital, 4 story, 50 x 150 ft., brick hospital wing, Queen St., to A. W. Cassidy Co., 1st Ave. N., $188,078. Noted Mar. 27.

CHURCHES

PROPOSED WORK

Md., Chestertown—J. J. Raskob, Wilmington, Del., bids after June 1, general contract church. $250,000. Noted Dec. 11.

Mass., New Bedford — St. Mary's Roman Catholic Parish, F. J. McKeon, pastor, 343 Tarkiln Hill Rd., 1 story, basement, stone, Tarkiln Hill Rd. and Pine Grove St. $150,000. Architect not selected.

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Churches (Continued)

Mass., Somerville (br. Boston) — St. Polycarp's Roman Catholic Church, J. E. O'Connell, pastor, 65 Temple St., sketches by O'Connell & Shaw, 134 Newbury St., Boston, 1 story, basement, granite. Temple St. To exceed $150,000.

N. H., Keene — Greek Catholic Church, H. Bardis, 19 Roxbury St., 1 story, basement church, probably brick, stone. $150,000. Architect not selected.

N. J., Carteret—St. Joseph's Roman Catholic Church, C. McCarthy, pastor, raising $200,000 funds 2 story, basement, brick, steel church, rectory, lyceum. $200,000. **Maturity in spring.** Architect not selected. Noted Nov. 27.

N. J., Jersey City—Westminster Presbyterian Church, H. L. Wyatt, pastor, 304 Academy St., 2 story, basement church, Academy St. $200,000. **Maturity probably in spring.** W. Neumann, 26 Journal Sq., archt. Noted Nov. 6.

N. J., Leonia—Calvary Lutheran Church will not build 2 story, Woodland Ave. $150,000. Project abandoned. Noted Nov. 21 Daily.

N. J., Perth Amboy — St. Mary's Roman Catholic Church, c/o G. W. Brooks, archt., 216 Smith St., 2 story, basement, brick, steel convent. $150,000. Noted Nov. 27.

N. Y., New York—Community Church, 12 Park Ave., bids in January, church, hotel, 12 Park Ave. Corbett, Harrison & McMurray, 130 West 42nd St., archts. Noted Sept. 25.

BIDS ASKED

N. J., Perth Amboy—G. W. Brooks, archt., 216 Smith St., bids about Mar. 1, general contract 2 story, basement, brick, Hull Ave., for St. Michaels Church, c/o architect. $150,000. Noted Dec. 11.

N. J., South River—A. Merchant, archt., 1 Elm Row, New Brunswick, bids about Feb. 25, general contract 1 and 2 story, tower, brick, steel church, incl. auditorium, Sunday school, class rooms, recreation hall, Main and Gordon Sts., for Conklin Methodist Church. $150,000. Noted Nov. 13.

SCHOOLS

PROPOSED WORK

Calif., Altadena — City of Pasadena School Dist. plans by Marston & Maybury, 25 South Euclid Ave., Junior High School, Lake Ave. $275,000.

Calif., Los Angeles — City of Los Angeles School Dist., plans by Austin & Ashley, Chamber of Commerce Bldg., 3 story, rein.-con. classroom and library unit, 2 story cafeteria, 1 story brick shop. $400,000.

Calif., Los Angeles — City of Los Angeles School Dist. plans by S. Nibecker, Jr., 1624 Bushnell St., South Pasadena, 2 story, basement, 118 x 262 ft., brick, concrete, 32nd St. $150,000.

Calif., Los Angeles — City of Los Angeles School Dist. school, Riverside Dr.; plans by C. M. Hutchison, 108 West 6th St., school, 87th St., both rein.-con. $75,000 each.

Calif., Pasadena — California Institute of Technology plans by G. B. Kaufmann, Union Bank Bldg., Los Angeles, Class A rein.-con. dormitory. $150,000.

Calif., San Francisco—City and San Francisco Co., plans by G. A. Applegarth, Claus Spreckels Bldg., Matt I Sullivan School, brick, concrete, Connecticut St. $150,000.

Calif., San Francisco—City and San Francisco Co. plans by F. H. Meyer, 742 Market St., brick, concrete additions. $125,000 or more.

Calif., Sebastopol—Analy Union High School Dist., plans by Davis-Pearce, Inc., Grant and Weber Sts., Stockton, 2 story, brick high school. $250,000.

Calif., West Los Angeles (br. Los Angeles)—University of Southern California, 3551 University Ave., Los Angeles, plans by D. H. McLellan, Architects Bldg., Los Angeles, 3 story, basement, 150 x 215 ft., Class A rein.-con. dormitory, Hilgard Ave. $250,000.

Calif., Westwood—St. John Military Academy sketches by E. Eames, 353 Sacramento St., San Francisco, 4 story, masonry, stucco school. $250,000 or more.

Calif., Yuba City — Yuba City Elementary School Dist. plans by Davis-Pearce, Inc., Grant and Weber Sts., Stockton, brick school. $150,000.

Ind., Oakland City—School Comrs., bids in February, brick, steel, stone high school, incl. auditorium, gymnasium. $150,000. H. E. Boyle & Co., Evansville, archts.

Ind., Richmond—School Comrs., sketches 4 schools. $228,000. Architect not selected.

Ind., South Whitley—School Comrs., plans by Griffith & Goodrich, 209 Bass Bldg., Ft. Wayne, rein.-con., brick, Cleveland Twp., Whitley Co. $150,000.

Ind., St. Meinard—St. Meinard Academy, E. Beirheide, supt., plans by Growe & Schulte, 2436 Reading Rd., Cincinnati, O., rein.-con., stone, hollow tile college, chapel dormitory. $150,000.

Ind., Valley Mills—School Comrs. plans by C. Byfield, 923 Peoples Bank Bldg., Indianapolis, brick, steel school. $150,000.

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Ky., Louisville—Bd. Educ., 8th and Chestnut Sts., plans by J. M. Cooley, c/o owner, 3 brick, stone schools, one in Highland Park, one in Jacobs addition, other in Oakdale. $250,000-$300,000 each.

La., Monroe—Ouachita Parish plans by J. W. Smith & Associates, Ouachita Natl. Bank Bldg., Junior College. $250,000.

Me., Portland—Maine School for Deaf, E. R. Taylor, principal, 85 Spring St., school unit, Payson Park. $150,000 or more. Architect not selected.

Me., Runford—Town, M. P. Abbott, pres. School Bd., plans by Bunker & Savage, 254 Water St., Augusta, altering and constructing 2 story, basement, brick, steel high school addition, incl. gymnasium, auditorium, plain found. $150,000. Noted Dec. 4.

Mass., Arlington (br. Boston)—Town, Building Com., J. Bitzer, revised sketches by Fay, Spofford & Thorndike, 44 School St., Boston, 2 story, basement, brick elementary school, Eastern Ave., Brattle Sect. $200,000. Noted Dec. 4.

Mass., Attleboro—City, School Dpt., L. A. Fales, supt., Junior High School, West Side Sect. $200,000 or more. Architect not selected.

Mass., Belchertown — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, sketches by Kendall, Taylor & Co., 209 Columbus Ave., Boston, 1 and 3 story, brick school, gymnasium at State School. $150,000.

Mass., Boston—City, Dpt. School Buildings, sketches by W. W. Drummery, Inc., 80 Boylston St., 2 story, basement, brick, limestone, Gilbert Stuart Dist., Dorchester. To exceed $150,000. Noted Dec. 25.

Mass., Brewster—Town, C. Clark, chn. Bd. Selectmen, altering and constructing grade and high school addition, Kings Hy. $150,000 or more. Architect not selected.

Mass., Cambridge—City, R. Russell, mayor, City Hall, 1 story, basement, brick, glass health school, near Rindge Field, North Cambridge. $150,000. Architect not selected.

Mass., Falmouth—Town, School Bd., 2 story, basement, brick grade school. $150,000. Architect not selected.

Mass., Falmouth—Town, A. L. Pattee, chn. School Bd., sketches by Haynes & Mason, 280 Main St., Fitchburg, Junior High School, 2 story, basement, brick, high school grounds. To exceed $150,000.

Mass., Lawrence — City, Superintendent Schools, 4 schools, 1 at Abbott and Bailey Sts., 1 at Fairmont and Auburn Sts., 1 at Park, Saratoga and Bunker Hill Sts., other at Sargent, Clark and East Haverhill Sts. To exceed $600,000. Architect not selected.

Mass., Norton—Wheaton College, J. E. Park, pres., sketches by Cram & Ferguson, 248 Boylston St., Boston, 2½ story, basement, brick student's alumnae building, on campus. $200,000 funds being raised for same.

Mass., Roxbury (sta. Boston)—City of Boston, Dpt. School Buildings, revised plans by H. H. Atwood, 61 St. Alban St., Dorchester, and takes bids about Jan. 15, Girl's High School, 3 story, basement, 200 x 300 ft., brick, limestone, plain found., Martin Dist. $1,500,000. Noted Mar. 13.

Mass., Roxbury (sta. Boston)—City of Boston, Dpt. School Buildings, sketches by Fay, Spofford & Thorndike, 44 School St., Boston, 2 story, basement, brick, limestone school, plain found. H. L. Higginson Dist. $220,000. Noted June 19.

Mass., Somerville (br. Boston)—City, Mayor's Office, City Hall, combination elementary school (vocational and continuation), Cross St. To exceed $150,000. Architect not selected.

Mass., Somerville (br. Boston)—City, Mayor's Office, City Hall, 2 story, basement, brick, stone, School St. $150,000-$200,000. Architect not selected.

Mass., Springfield—City, Bd. Educ., technical high school addition. To exceed $150,000. Architect not selected.

Mass., Wellesley (br. Boston)—Town, Bd. Selectmen, H. L. Miles, brick school, near Worcester St., Fells Sect. $150,000. Architect not selected.

Minn., St. Paul — College of St. Thomas, M. A. Schumacher, pres., Cleveland and Summit Aves., 2 or 3 story, basement, rein.-con., brick, stone administration school, Cleveland and Summit Aves. $250,000.

Neb., Hastings—C. H. French, Hastings College, raising $760,000 funds of which $750,000 for main college building, chapel, library, Taylor Hall, and heating plant; $10,000 for biological, chemical laboratory, and library equipment. Architect not selected.

N. J., Bloomfield—Bd. Educ., City Hall, plans by Bartlett & Marsh, Lefcourt Bldg., Newark, 2 story, basement, brick, steel, Watchung and Broughton Aves. $250,000. Noted Apr. 28.

N. J., Elizabeth—Bd. Educ., 417 South Broad St., 3 story, basement, brick, steel, South Broad St. $150,000. Project in abeyance. H. B. Brady, Inc., 333 North Broad St., archt. Noted Aug. 7.

N. J., Glen Rock—Bd. Educ., Boro Hall, plans by Adams & Prentice, 15 West 38th St., New York, general contract 2 story, basement, brick, steel, rein.-con. addition to School 2. $150,000. Noted Oct. 30.

N. J., Phillipsburg—Bd. Educ., High School, plans by A. Merchant, 1 Elm Row, New Brunswick, 2 story, basement school, Ingersoll Heights. $150,000. Noted Oct. 23.

N. J., Ramsey—Bd. Educ., High School, 2 story, basement, brick, steel school. $150,000. Architect not selected.

N. J., Woodbridge—Bd. Educ., Barron Ave., 2 story, basement, addition to Junior High School, School St. $150,000. Jensen & Rasmussen, 218 Smith St., Perth Amboy, archts. **Maturity in spring.** Noted Nov. 27.

N. Y., Batavia—Dpt. Standards & Purchase, State Office Bldg., Albany, bids in February, dormitory at New York School for Blind. $150,000. Noted Dec. 25.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, Flatbush Ave. extension and Concord St., Lafayette High School, Ocean Parkway and Avenue P. $2,500,000.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, Flatbush Ave. extension and Concord St., addition to P. S. 101, 24th St. and Benson Ave. $484,000. Noted July 3.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, Flatbush Avenue Extension and Concord St., altering and constructing 4 story addition to school, Avenue S from West 4th to West 5th Sts. $350,000.

Tex., Galveston — Bd. Educ., Junior High School, 24 room, brick, rein.-con., plain found., $200,000; also Junior High School, brick, rein.-con., plain found. in western part city. $150,900. Address Bd. Educ.

N. Y., New York—Bd. Educ., 500 Park Ave., plans by W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, P. S. 106, Bronx Boro. $460,000.

N. Y., New York—New York—University, A. Johnson, in charge, Washington Sq., sketches by J. G. Rogers, 154 East 46th St., Library, Washington Sq. $5,000,000. **Maturity indefinite.** Noted Apr. 3.

Pa., Pottsville—Bd. Educ., 5th and Norwegian Sts., I. I. Doddon, secy., plans by W. B. Ittner, Bd. Educ. Bldg., St. Louis, Mo., and takes bids early in spring, 4 story, basement, rein.-con., brick, steel high school, plain found. $900,000.

Pa., Springfield — School Dist. Springfield Twp., Montgomery Co., E. H. Hahn, pres., sketches Junior High School, Leaming and Woodland Aves. Architect not selected.

R. I., Central Falls — St. Mathieu's Roman Catholic Parish, J. A. LaLiberte, Fenner St., Providence, altering and constructing parochial school addition, Dexter St. $150,000 or more. Architect not selected.

Tex., Huntsville—Bd. Educ., plans by H. D. Payne, Kirby Bldg., Houston, school. $150,000.

Vt., Northfield—Trustees Norwich University, science unit at university. $150,000. Architect not selected.

Wis., Milwaukee—Bd. School Directors plans by G. E. Wiley, c/o School Bd., and bids in summer Juneau Ave. High School, $750,000; Fiebrantz Senior and Junior High School, $1,200,000; bids about March Tippecanoe School $350,000.

BIDS ASKED

Calif., Oakland—Jan. 27, by City of Oakland School Dist., Fremont High School, 3 story, basement, steel, concrete, 45th Ave. and Foothill Blvd. $400,000. C. W. McCall, 1404 Franklin St., engr.

D. C., Wash.—Jan. 20, by Dist. Comrs., District Bldg., Deanwood School addition.

Fla., Apalachicola—Jan. 14, by Bd. Pub. Instruction, Franklin Co., Court House, altering and constructing addition to Chapman High School. E. R. James, Apalachicola, archt.

Ind., Bloomington—Jan. 23, at office J. W. Craven, secy. Bd. of Trustees, Indiana University, 4 story, basement, 100 x 340 ft., rein.-con., limestone union buildings, on campus. $600,000. Granger & Bollenbacher, 333 North Michigan Ave., Chicago, Ill., archts. Noted Oct. 23.

Ind., Greencastle — DePauw University bids about Mar. 1, steel, stone recitation hall. $250,000. R. F. Daggett, 922 Continental Bank Bldg., Indianapolis, archt.

Ind., Indianapolis — School Comrs., A. B. Good, dir., 150 North Meridian St., bids about Jan. 20, School 82, rein.-con., brick, stone, English and Emerson Aves. $190,000. McGuire & Shook, 941 North Meridian St., archts. Bevington-Williams, Inc., 1139 K. of P. Bldg., engrs. Noted Nov. 13.

Mich., Detroit—Jan. 14, by C. A. Gadd, bus. mgr. Bd. Educ., 3 story, basement, brick, steel, rein.-con. stone addition to Cooley High School, plain found., Hubbell and Coyle Aves., $366,000, Donaldson & Meier, 1188 1st Natl. Bank Bldg., archts.; also 2 story, basement, brick, steel addition to school, plain found., Wagner Ave., Malcolmson, Higginbotham & Trout, 1217 Griswold St., archts.

N. J., Piscatawaytown—Bd. Educ., Raritan Twp., bids about Mar. 1, 2 story, basement, brick, steel addition to Oak Tree School. $150,000. Jensen & Rasmussen, 218 Smith St., Perth Amboy, archts. Noted Nov. 13.

Schools (Continued)

N. J., Washington — Bd. Educ., Boro Hall, bids about Mar. 1, general contract 2 story, basement, brick, steel high school. North Carleton Ave. $150,000. C. G. Jones, 133 Academy St., Belleville, archt. Noted Dec. 25.

N. J., Wyckoff—Bd. Educ., School Bldg., bids about Jan. 15, 2 story, basement, brick, steel, plain found., Grand View Ave. $150,000. Lee & Hewitt, 152 Market St., Paterson, archts. Noted Dec. 18.

O., Cleveland—Jan. 19, by Bd. Educ., F. G. Hogen, dir., 3 story, basement, 200 x 384 ft., brick, steel, concrete high school, East 74th St. $1,000,000. G. M. Hopkinson, Auditorium Garage Bldg., archts.

O., Painesville—Jan. 23, by Bd. Educ., E. Tucker, clk., two 2 story, basement, brick, steel, concrete schools. $150,000. Fulton & Taylor, 8120 Euclid Ave., Cleveland, archts. Noted Dec. 4.

Pa., California — First Methodist Episcopal Congregation, H. A. Price, pastor, taking bids 3 story, basement, brick, hollow tile educational and recreation building, 3rd and Liberty Sts. $150,000. Methodist Episcopal Bureau of Architecture, 1701 Arch St., Phila., archts.

Wash., Renton — W. Mallis, archt., Lyon Bldg., Seattle, bids about Apr. 1, 3 story, 116 x 235 ft., brick, rein.-con. school, incl. assembly hall, 2 gymnasiums, for Bd. Educ. $200,000.

CONTRACTS AWARDED

Calif., Los Angeles—Urban Military Academy, 637 North Wilcox St., group 1 and 2 story buildings, to Austin Co., 1626 Cardova St., Los Angeles, and 16112 Euclid Ave., Cleveland, O. Est. $150,000. Noted Apr. 17.

Calif., Santa Clara — University of Santa Clara, 2 story, basement, rein.-con. library, to H. C. Miller, Santa Clara, $150,000.

Conn., New Haven—Yale University, T. W. Farnum, constr. supt., Bowers Hall addition to school of forestry, brick, steel, stone, to Casper Ranger Constr. Co., 20 Bond St., Holyoke, Mass., est $750,000; Chittendon Lindsley Building, 3 story, basement, stone, concrete, to Dwight Building Co., 67 Church St., est. $250,000.

D. C., Wash.—District Comm., District Bldg., general contract school, Northampton St. and Broad Branch Rd., to C. S. Bannett, Inc., 47th and Springfield Ave., Phila., Pa., $103,390; Crosby-Noyes School, to Loudoun-Rust Co., Wash., D. C., $68,445. Noted Nov. 20.

Mass., Holyoke—City, Bd. P. Wks., 3 story, basement, 150 x 235 ft., brick, steel vocational school, plain found., to M. J. Walsh & Sons, Shawmut Ave., $194,700; heating and ventilating, to J. J. Dowd & Co., 109 Ely St., $32,000. Noted Nov. 27.

Mass., Newton—City, S. Weeks, mayor, City Hall, altering and constructing 1 and 2 story, basement, brick, stone addition, incl. gymnasium, plain found., to M. Slonnick, 333 Washington St., Boston. Est. $150,000. Noted Dec. 4.

Mass., West Roxbury (sta. Boston)—Dpt. School Buildings, Boston, altering and constructing 2 story, basement, brick, stone addition, plain found., to Archdeacon & Sullivan, 1742 Washington St., Boston. Est. $150,000. Noted Dec. 11.

Mo., St. Louis — St. Louis University, B. Johnston, pres., Grand Blvd. and West Pine St., general contract 4 story, basement, 125 x 184 ft. School of Commerce and Finance, to Gillespie & Daly, Inc., 418 International Bldg., est. $250,000; excavating, to Home Excavating Co., 6428 Gates Ave. Noted Nov. 13.

N. J., Irvington (br. Newark) — Bd. Educ., 1253 Clinton St., general contract altering and constructing 2 story, basement, brick, steel addition, Grove St., to L. Deutsch, 879 Bergen St., Newark. $114,000, alternate $143,000. Noted Dec. 25 Daily.

N. Y., Rochester — Bd. Educ., masonry for Washington Junior High School, to M. Iuppa & Maggio Co., 264 Magee Ave., $357,991; steel, to F. L. Heughes & Co., Inc., 1029 Lyell Ave., $83,000; carpentry, to Saucke Bros. Constr. Co., 82 Saranac St., $61,412; heating and ventilating, to Wright & Alexander Co., 210 Otsego St., $133,344. Grand total $635,747.

O., Cleveland—Bd. Educ., F. J. Hogan, dir., 3 story, basement, 224 x 416 ft. brick, steel, concrete high school, to John Grant & Son, 3868 Carnegie Ave., $494,860. Noted Aug. 28.

R. I., Providence—City, Pub. Building Dpt., 3 story, basement, 83 x 140 ft., brick, steel, limestone, to E. Turgeon, 36 Exchange Pl., $179,985; heating, to F. Dupuis, 599 Main St., Pawtucket, $40,450. Noted Dec. 25.

S. C., Columbia — University of South Carolina, D. M. Douglas, pres., general contract new educational building, to J. J. McDevitt Co., Charlotte, N. C., $230,175; plumbing and heating, to Clark Heating Co., Columbia, $32,300. Noted Oct. 23.

Wis., Madison — Bd. Regents University of Wisconsin, M. E. McCaffrey, secy., general contract 3 story, basement, 40 x 80 ft. and 50 x 90 ft. horticultural building, to Immel Constr. Co., Fond du Lac, $131,176. Noted Nov. 20.

Wis., Milwaukee—Bd. Normal School Regents, Madison, general contract 2 story, 100 x 170 ft. field house and 50 x 90 ft. gymnasium at State Normal School, to Bentley Bros., 1828 West Pierce St., $153,444; plumbing, to Wenzel & Henoch, 5025 State St., $14,336; heating, to Stoehr & Landon, Inc., 1707 Clybourn St., $21,988; electrical work, to Nihlein-Ortmann Co., 160 Ogden St., $10,189. Grand total $199,957. Noted Sept. 18

Wis., West Allis — Bd. Educ., heating and ventilating in school, 54th St., to Thomas Heating Co., Racine, $25,388. Noted Dec. 4, under "Contracts Awarded."

THEATRES

PROPOSED WORK

Mo., Clayton—Syndicate, c/o H. F. Hencken, 8000 Forsythe St., sketches by R. A. M. Anderson, 53 West Jackson Blvd., Chicago, Ill. and B. F. Barnes & F. R. Leimkuehler, 1626 Chemical Bldg., St. Louis, sketches 5 story, basement, rein.-con., brick, stone, terra cotta, theatre, office, garage, on 103 x 212 ft. site, Forsythe Blvd. between Central and Meramec Sts. $500,000.

Neb., Lincoln—H. L. Smith, 627 Sharp St., soon takes bids 9 story, basement, 100 x 175 ft. theatre, apartment, 14th and O Sts. $300,000.

N. J., Hackensack—T. W. Lamb, archt., 644 8th Ave., New York, soon lets general contract 1 and 2 story, basement, 125 x 200 ft., brick, steel, rein.-con. theatre, 311 Main St., for W. Fox, 850 10th Ave., New York. $1,000,000. Weinberger & Washoff, Inc., 247 Park Ave., New York, engrs. Noted Oct. 23.

CONTRACTS AWARDED

N. J., Newark—Elwood Theatre, c/o Harris & Sohn, archts., 17 Mechanic St., general contract 2 story, basement, brick, steel, to State Builders, Inc., 24 Commerce St. Est. $150,000. Noted Dec. 18.

BANKS

PROPOSED WORK

Mass., Boston — Boston Five Cents Savings Bank, W. R. Evans, pres., School St., altering and constructing bank addition. $150,000 or more. Architect not selected.

Mass., Somerville—Winter Hill Co-operative Bank, G. Lovejoy, pres., 80 Broadway, sketches by Desmond & Lord, 1 Beacon St., Boston, 1 story, basement (3 buildings, 1 main entrance), brick, stone, steel, concrete found., Cutter Sq. $250,000. Noted Dec. 18.

N. Y., New York — Centrum Corp., F. J. Fuller, pres., 70 Bway., plans by Cross & Cross, 385 Madison Ave., 3 story bank, 35 East 72nd St. $150,000.

R. I., Providence—High Street Bank, 846 Westminster St. and Angell & Swift, archts., 87 Westminster St. soon lets contract 1 story, basement, brick, steel, concrete, concrete found., Winter and Westminster Sts. $150,000.

BIDS ASKED

Pa., Reading—Jan. 12, by L. B. Rothschild, archt., 215 South Broad St., 15 story, basement, 46 x 79 ft., rein.-con., brick, steel bank, office, plain found., 6th and Pennsylvania Sts., for J. J. and R. H. Greensburg, Fidelity-Philadelphia Trust Bldg. $500,000.

CONTRACTS AWARDED

Mass., Newton — Newton Trust Co., W. H. Hallidal, treas., 282 Washington St., New Haven, Conn., altering and constructing 1 story, basement, irregular sized, brick, stone, steel, concrete addition, plain found., Waban Sect., to Sawyer Constr. Co., Park Sq. Bldg., Boston. Est. $150,000.

OFFICES

PROPOSED WORK

Calif., San Francisco — Eureka Benevolent Society, 436 O'Farrell St., plans by Hyman & Appleton, 68 Post St., 3 story, basement, brick, steel, Post and Scott Sts. $150,000.

Mass., Springfield—Society for Prevention of Cruelty to Animals, F. Rowley, 180 Longwood Ave., Boston, sketches by Putnam & Cox, 114 State St., Boston, office and animal ward buildings, Bliss St. $150,000.

N. J., East Orange—C. Mumma, 147 Halstead St., will not build office, stores, Central Ave. and Amherst Sts. Project abandoned. Noted Oct. 28 Daily.

N. J., Jersey City—Stone House Realty Co., A. W. Feinberg, lawyer, 75 Montgomery St., brick, steel office, stores, Summit Ave. and Newark St. $150,000 or more. Architect not selected. **Maturity indefinite.**

N. Y., New York—A. Grosfeld, Furniture Co., 801 3rd Ave., bids late in March, general and separate contracts office, store, showrooms, 309-15 East 48th St. $500,000. Private plans. Noted Mar. 20

BIDS ASKED

Ill., Waukegan—A. Epstein, archt., 2000 West Pershing Rd., Chicago, bids about Jan. 15, superstructure 3 story, basement, 116 x 132 ft., brick, stone office, store and apartment building, Genesee and Water Sts., for J. Blumberg, Waukegan. $200,000. Foundations now going in.

N. J., Irvington (mail Newark) — United States Realty & Investment Co., 972 Broad St., Newark, bids about Mar. 15, general contract 2 story, basement, 80 x 160 ft., brick, steel office, stores, 1015-19 Springfield Ave. $150,000. W. E. Lehman, 972 Broad St., archt. Noted Dec. 4.

N. Y., New York — W. W. Ahlschlanger, archt., 10 East 40th St., taking bids general contract office, 6th Ave. and 41st St., for Corporation c/o architect. $2,000,000. Noted Nov. 20.

CONTRACTS AWARDED

Pa., Phila. — Fireman's Insurance Co. (Mechanics Insurance Co. of Phila., N. Bassett, pres.), 10 Park Pl., Newark, N. J., 8 story, basement, 50 x 70 ft., brick, steel, plain found., 5th and Walnut Sts., masonry work and general contract, to Starrett Bros., 101 Park Ave., New York; face brick, to Fildenberg & Lounsbury, Otis Bldg.; granite, to P. W. Bounds, Watkinson Ave.; heating, to V. N. Wilamb, 105 North Watts St.; iron work, to Creswell Iron Works, Cherry and 23rd Sts.; lath and plastering, to C. C. Boulden, 1414 South Pennsylvania Sq.; refrigerating work, to T. S. Johnson & Sons Co., 626 Cherry St.; elevators, to Otis Elevator Co., 502 North 19th St.; steel sash, to D. Lupton Sons Co., 1528 Walnut St. Est. $250,000.

O., Dayton—Schenck & Williams, archts., 3rd Natl. Bldg., concrete cement, brick and carpentry for 20 story, rein.-con., steel office, bank building, to A. W. Kimmel, Inc., 480 Huffman Ave., for Mutual Home Building & Loan Assn., 2nd and Main Sts. Total est. $1,000,000. Noted Nov. 13.

LOFTS

PROPOSED WORK

N. Y., New York—Sampson Rosenblatt, 565 5th Ave., will not build 20 story loft, 179 Varick St. $500,000. Project abandoned. Noted Apr. 24.

BIDS ASKED

N. Y., New York—Clemons Realty Co., 570 7th Ave., bids Mar. 1, general contract loft, store, factory, 211 West 29th St. $300,000. J. H. Knubel, 570 7th Ave., archt. Noted Sept. 25.

STORES

PROPOSED WORK

Mass., Boston—Owner, c/o G. F. Wentworth, 11 Pemberton Sq., 6 story, basement, brick, steel stores, manufacturing and loft building, 11 Columbia St. $150,000 or more. Private plans.

BIDS ASKED

Conn., Hartford—See "Contracts Awarded."

N. J., Lyndhurst (br. Rutherford) — P. J. Jossier, archt., 240 Broad Ave., Palisades Park, bids about Mar. 15, general contract 2 story, basement, 90 x 100 ft., brick store, apartment, for Owner, c/o architect. Noted Nov. 20.

CONTRACTS AWARDED

Conn., Hartford—Wise-Smith & Co., 915-39 Main St., 2 story (ultimately 3 story), basement, 43 x 140 ft., brick, steel store, Main St., separate contracts, F. W. Woolworth, 75 State St., Albany, N. Y., lessee.

PUBLIC

PROPOSED WORK

Kan., Goodland—COURT HOUSE—Sherman Co. sketches by Rutledge & Hertz, 204 State Exch. Bldg., Hutchinson, court house, $150,000. Noted Dec. 11.

Me., Bangor—ALMSHOUSE—State, Public Welfare Dpt., State House, Augusta, almshouse. To exceed $150,000. Architect not selected.

Mass., Somerville (br. Boston)—FIRE STATION—City, J. J. Murphy, City Hall, brick, Winter Hill, East Somerville. $150,000 or more. Architect not selected.

Mass., Somerville (br. Boston) — POLICE STATION — City, J. J. Murphy, mayor, City Hall, brick police station. $275,000. Architect not selected.

Mass., Watertown — ADMINISTRATION — Town, E. P. Furber, chn. Building Com., revised sketches by R. C. Sturgis, 120 Boylston St., Boston, brick, Main St. $205,000. Noted Dec. 4.

N. J., Englewood Cliffs—BORO HALL—Bd. Boro Council, Boro Hall, 2 story, basement, brick, steel, plain found. $150,000. Architect not selected.

N. J., Leonia—MUNICIPAL—Bd. Boro Council, Boro Hall, will not build 2 story, basement, building. Project abandoned. Noted Nov. 13 Daily.

N. J., Morristown—JAIL and OFFICE—Bd. Freeholders Morris Co., Court House, bids after Feb. 15, general contract jail and office building. To exceed $150,000. Palmer & Plonsky, 55 William St., New York, archts. Noted Nov. 27.

N. Y., Jamaica — ARMORY — Armory Bd., Municipal Bldg., New York, bids after May 1, general contract 104th Field Artillery, Willow St. To exceed $1,500,000. C. B. Meyers, 31 Union Sq., New York, archt. Noted May 8.

N. Y., New York—ARMORY, etc.—Armory Bd., City of New York, Municipal Bldg., bids early in February, general contract armory, administration building for 369th Infantry, 142nd St. and 5th Ave. $1,000,000. Van Wart & Wein, 347 Madison Ave., archts. Noted Oct. 2.

N. Y., New York — POLICE HEADQUARTERS — Police Dpt., 240 Center St., plans by T. E. O'Brien, 400 Broome St., police headquarters building. $8,000,000. Noted Feb. 20.

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Public (Continued)

Ohio—PENITENTIARY BUILDINGS, etc.—H. H. Griswold, dir. Welfare, Columbus, state institution improvements as follows: new maintenance building $150,000, new hospital $125,000, and new cell block $100,000, all at Ohio Penitentiary, Columbus; new cottage $200,000, repairs $30,000, fire protection $55,000, all at Columbus State Hospital, Columbus; new cottage $150,000, at Orient Institution for Feeble Minded, Orient; cottage $75,000, for Boys' Industrial School, Lancaster; cottage $75,000, at Bureau of Juvenile Research, Columbus; cottage $75,000, and fire protection $50,000, at Girls' Industrial School, Delaware; new receiving home $50,000, Division of Charities, Columbus; completion of Institution for the Feeble Minded at Apple Creek, $2,000,000.

O., Cleveland — INSTITUTIONAL — Juvenile Courts Building Comn., F. J. Husak, clk., Court House, plans by F. W. Bail, Hanna Bldg., group buildings for Detention Home, East 22nd St. and Central Ave. $1,650,000. Noted Nov. 20.

O., Cleveland—PUBLIC HALL—City, D. E. Morgan, city dir., sketches by E. G. Bauer, 504 City Hall, 1 story, steel, concrete, marble annex, East 3rd St. and Lakeside Ave. $1,500,000.

R. I., Providence—COURT HOUSE—State, Providence Co. Court House, W. B. Greenough, chn. com., 30 South Main St., sketches by Jackson, Robertson & Adams, Turks Head Bldg., 2nd section, southwest corner Benefit and College Sts. To exceed $150,000.

Que., Montreal—CIVIC RESTAURANT—City 1 story, 60 x 160 ft., stone, chateau style, 1,000 seating capacity. $210,000.

BIDS ASKED

Conn., Simsbury—HALL—Jan. 17 (extended date), by Town, Bd. Selectmen, Town Hall, Enos Memorial Town Hall, 2 story, basement, 160 x 200 ft., brick, stone. $350,000. Smith & Bassette, 36 Pearl St., Hartford, archts. Noted Dec. 25.

Ill., Cairo—ARMORY—Feb. 3, by C. H. Herrick, superv. archt., State House, Springfield, armory for Company K, 131st National Guard. $175,000.

Kan., Alma—COURT HOUSE—Jan. 22, by Clerk Wabaunsee Co., 3 story, ground floor, 69 x 103 ft., rein.-con., brick, fireproof. $150,000. W. E. Glover, 301 Reserve Bank Bldg., Topeka, archt. Noted Dec. 25.

N. J., Elizabeth—COURT HOUSE—Bd. Freeholders Union Co., Court House, bids about Mar. 15, 5 story, basement, brick, steel, rein.-con. addition, Broad and Rahway Sts. $500,000. Oakley & Son, 1259 Clinton Pl., archt. Noted Nov. 27.

N. J., Glen Ridge—MUNICIPAL—Bd. Boro Council, Boro Hall, bids about Apr. 1, general contract 2 story, basement, brick, steel, Ridgefield Ave., and Bloomfield St. $175,000. W. D. Bartlett, Lefcourt Bldg., Newark, archt. Noted Oct. 2.

N. Y., Brooklyn—COURT HOUSE—Jan. 14, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, general contract magistrates and municipal court house, 4th Ave. between 42nd and 43rd Sts. Noted Sept. 11.

N. Y., New York—HEALTH OFFICE—Dpt. Health, S. W. Wynne, pres., Bd. Health, 505 Pearl St., bids about Apr. 1, general contract 8 story, granite, sandstone, North, Center, Lafayette and Leonard Sts. $4,000,000. C. B. Myers, 31 Union Sq., archt. Noted June 6, 1929.

Tex., Menard—COURT HOUSE—Menard Co., c/o Judge, bids about February, 4 story, basement, 80 x 104 ft., monolithic concrete. Square. $150,000. Withers & Thompson, 201 Holmes Bldg., Fort Worth, archts. Noted Jan. 1.

CONTRACTS AWARDED

Calif., Pasadena — AUDITORIUM — Bd. City Directors, general contract rein.-con., to W. C. Crowell, 495 South Bway., $704,850. Noted Dec. 18.

Md., Baltimore—LIBRARY—Bd. Awards, 7 story, 150 x 300 ft., brick, rein.-con., cut stone, limestone, steel (Enoch Pratt Free Library), to George A. Fuller Co., Munsey Bldg., Wash., D. C., $2,044,000. Noted Dec. 4.

N. J., Bayonne — FIRE HOUSE — Bd. City Comrs., City Hall, general contract 2 story, basement, brick, steel, plain found., to G. Siegler Co., Inc., 24 Journal Sq., Jersey City; plumbing, to D. L. Handman, 43 Neptune Ave., Jersey City; heating and ventilating, to J. Sloss, Bayonne; electrical work, to J. R. Proctor Co., 16 West 9th St., Bayonne; oil burners, to A. B. C. Oil Burner Co., 281 North Broad St., Elizabeth. Est. $150,000. Noted Nov. 27.

N. Y., New York — COURT HOUSE — H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., excavating Bronx County Building site, to Delma Constr. Co., Troy, $68,750. Noted Dec. 18.

N. Y., New York—PRISON—Dpt. Correction, Municipal Bldg., general contract Rikers Island Penitentiary, to P. J. Carlin Constr. Co., Grand Central Terminal, $5,340,713. Noted Nov. 27.

N. Y., Oyster Bay—TOWN HALL—Town Bd., general contract altering, repairing town hall, to Oliver Bros. Building & Constr. Co., East Main St., $144,250; electrical work, to M. D. Burggraff, South St., $4,835; heating and plumbing, to J. McCullagh, East Main St., Hicksville, $7,366 and $5,164 respectively. Grand total $161,615.

Tex., Graham—COURT HOUSE—Young Co., c/o W. F. Parsley, judge, 2 story, basement, 84 x 122 ft., rein.-con., Bedford stone, to J. T. Taylor, Aviation Bldg., Fort Worth, $297,772. Noted Dec. 4.

BUILDINGS—UNCLASSIFIED

PROPOSED WORK

La., New Orleans—STATION—Illinois Central R.R. Co., 135 East 11th Pl., Chicago, Ill., A. F. Blaess, ch. engr., uptown Union Station to serve railroads entering city above Canal St. Est. includes necessary tracking, etc. $5,000,000. C. E. Smith & Co., 1752 Railway Exch. Bldg., St. Louis, Mo., consult. engr. Southern Pacific and Gulf Coast lines will lease part.

La., New Orleans—STATION—C. E. Smith & Co., 1752 Railway Exch. Bldg., St. Louis, Mo., submitted report for downtown Union Stations, at North Saratoga and St. Peters Sts., incl. 10 tracks with double track elevated approach, about 2 mi. new double track for Louisville & Nashville R.R. and 0.5 mi. track for Southern R.R. Station to be built by either Louisville & Nashville R.R. Co., Louisville, Ky., W. H. Courtenay, ch. engr. on Southern Ry. Co., 15th and K Sts., Wash., D. C., B. Herman, ch. engr. $6,300,000.

N. Y., New York—GARAGE and STORE—R. Lowenthal, 1880 Grand Concourse, bids after May 1, general contract 50 x 190 ft. service garage and stores, Bailey Ave. and 230th St. $150,000. A. Slavin, 2690 University Ave., archt. Noted Sept. 18.

N. Y., New York—RESTAURANT—Childs Co., 200 5th Ave., bids in spring, general and separate contracts restaurant, kitchen, storage, 136 William St. $150,000. J. C. Westerveld, 36 West 34th St., archt. Noted Oct. 23.

Pa., Pittsburgh—HOME for AGED—Jewish Home for Aged, J. H. Frank, pres., 4219 Saltine St., plans by Marks & Kann, Home Trust Bldg., brick home, near Homestead Bridge. $150,000.

BIDS ASKED

Mass., Holyoke—EXCHANGE—New England Telephone & Telegraph Co., 245 State St., Boston, taking bids 3 story, basement, 85 x 90 ft., brick, steel. $150,000. Densmore, LeClear & Robbins, 31 St. James Ave., Boston, archts. Noted Oct. 23.

N. J., Lakewood — MOTION PICTURE STUDIO, etc. — Lakewood Studio Co., G. H. Glass, c/o D. J. Scrocco, archts., 60 Park Pl., Newark, bids about Mar. 1, general contract 2 story, with 10 story tower, 200 x 800 ft., brick, steel, rein.-con. motion picture, radio and broadcasting studio, Pine Forest Manor. $500,000. Noted Dec. 25.

N. Y., New York—HOME—Volunteers of America, 34 West 28th St., bids about Apr. 1, general contract 15 story, brick, steel home. A. Mertin, 34 West 28th St., archt. Noted Sept. 25.

CONTRACTS AWARDED

Ind., Indianapolis — MAUSOLEUM — Glen Haven Cemetery Assn., 319 Chamber of Commerce Bldg., general contract 3 story, rein.-con., stone, marble, Kessler Blvd. and Michigan Rd., to L. Colvin, 803 Continental Bank Bldg. Est. $1,800,000.

N. Y., Buffalo — EXCHANGE — New York Telephone Co., 44 Church St., excavation and foundation work for telephone exchange, Elmwood Ave. and Anderson Pl., to John W. Cowper Co., Rand Bldg. Total est. $400,000.

Wis., Sheboygan — PACKAGE FREIGHT TERMINAL and GARAGE — Milwaukee Electric Ry. & Light Co., 217 Michigan Ave., general contract 1 and 2 story, 40 x 180 ft. package freight terminal and motor bus garage, to Guehlsdorff & Heyer, Sheboygan. Noted Nov. 20.

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Buildings

FACTORIES AND MILLS

PROPOSED WORK

Calif., Long Beach—FACTORY—Ford Motor Co., 3674 Schaefer Rd., Dearborn, Detroit, plans by Albert Kahn, Inc., Marquette Bldg., main factory addition. To exceed $350,000.

Calif., South San Francisco—NEWSPAPER PUBLISHING PLANT—Peninsula Newspapers, Inc., 248 Hamilton St., plans by J. McCool, 381 Bush St., 3 rein.-con. publishing plants, one here, one at Palo Alto, other at Redwood City. $50,000 each.

Calif., Stockton—SUGAR REFINERY—Holly Sugar Co., West Channel St., sketches fireproof, probably rein.-con. refinery. To exceed $150,000.

Ill., Galesburg—GATE FACTORY—Rowe Mfg. Co., rebuilding 1 story, rein.-con., steel, plain found., West 3rd St., recently destroyed by fire. $50,000 or more. Architect not selected.

Ill., National City—RENDERING PLANT—East St. Louis Rendering Co., soon takes bids 3 story, 40 x 75 ft., rein.-con. plant. $80,000. C. E. Smith & Co., 1752 Railway Exch. Bldg., St. Louis, Mo., archts.

Ill., Pekin—CORN SUGAR PLANT—Corn Products Refining Co., 17 Battery Pl., New York, sketches manufacturing plant. To exceed $1,000,000.

Mass., Everett—PLANT—Merrimac Chemical Co., Chemical Lane, soon lets contract 2 story, brick, concrete, steel nitric acid building, plain found. $50,000 or more. Private plans.

Mass., South Lee—PLANT—Dwight D. Hopkins Lumber Co., brick woodworking plant, $75,000, incl. new machinery. Private plans.

Mo., Kansas City—PLANT—Corn Products Refining Co., 17 Battery Pl., New York, sketches corn syrup and corn products manufacturing plant addition. To exceed $200,000.

N. J., Carlstadt—ICE PLANT—Carlstadt Consumers Ice Co., 501 11th St., sketches remodeling 1 story ice manufacturing plant, 11th St. $40,000.

N. J., Irvington (br. Newark)—T. J. Lee, c/o N. J. Convery, 32 Walnut St., Newark, will not build 2 story, basement, 50 x 200 ft. warehouse, showroom. Project abandoned. Noted Dec. 25.

N. J., Ridgefield—LITHOGRAPH SHOP—Lowe Paper Co., River Rd., sketches 1 story, brick, steel, near boro disposal plant. $50,000.

N. Y., Brooklyn — BAKE SHOP, etc. — H. Loczlo & H. Kronowitz plans by S. Millman, 1780 Pitkin Ave., altering 3 story bake shop, ovens, and replacing equipment, Wythe Ave. and 7th St. $40,000.

N. Y., Brooklyn—POULTRY MARKET and PACKING PLANT—Two Thousand Seven Hundred Sixty West 17th Street Corp., D. Berman, pres., 3145 East 4th St., revised plans by F. Savignano, 6005 14th Ave., 2 story, 40 x 62 ft. poultry market and packing plant, Neptune St. and Cropsey Ave. $40,000.

N. Y., New York — PLANT — J. and J. W. Williams, 351 West 54th St., 5 story carpet renovating plant, Walton Ave. and 144th St. To exceed $150,000.

O., Cleveland — OIL REFINERY IMPROVEMENTS—See "Contracts Awarded."

Tex., Rotan — MEAT PACKING and REFRIGERATING PLANT — Circle Bar Cattle & Packing Co., c/o W. W. Barron, pres., sketches rein.-con., brick, steel, plain found. $150,000. Private plans.

Ont., Iroquois—BAKERY, GRINDING MILL, etc.—Beach Milling Co., M. W. Beach, mgr., bakery, feed grinding mill and ice cream manufacturing plant. $60,000.

Ont., Leaside—WATERPROOFING FACTORY—Tremco Mfg. Co. of Canada Ltd., subsidiary of Tremco Mfg. Co., 393 East 131st St., Cleveland, O., 2 story factory.

Ont., Meaford — FLOUR and CHOPPING MILLS—Burns Bros. rebuilding mills, recently destroyed by fire. $100,000 loss. Interested in prices complete equipment.

Ont., Toronto—FACTORY—Crompton, Parkinson Ltd., Dagenham, England, electrical apparatus plant.

Que., Montreal — DYE PLANT — Dechaux Freres Ltd., 2142 Beaudry St., plans by S. Comber, 620 Cathcart St., addition. $75,000.

Que., Montreal—PLANT—Dominion Rubber Co. Ltd. addition, Notre Dame St. E. $100,000.

BIDS ASKED

Ill., Galesburg—FACTORY, etc. See "Contracts Awarded."

Mass., Natick—ICE PLANT—See "Contracts Awarded."

N. J., Cranbury—FACTORY—See "Contracts Awarded."

N. J., Elizabeth — SHIRT FACTORY — L. Quien, Jr., archt., 229 Broad St., taking bids general contract altering and constructing 2 story, basement, 35 x 100 ft., brick, steel addition, 5th and Fulton Sts., for Fordham Shirt Co., Fulton St. $40,000. Noted Dec. 4, under "Contracts Awarded."

N. J., Jersey City—ICE PLANT—Mongiello Bros., 625 Communipaw Ave., bids about Mar. 1, general contract 1 story, basement, 100 x 100 ft., brick, steel, plain found. $50,000. C. H. Ziegler, 26 Journal Sq., archt. Noted Nov. 6.

N. Y., Brooklyn — ICE PLANT — Supreme Coal & Ice Co., 551 Nostrand Ave., taking bids general contract, ice plant, Lexington and Marcy Aves. $75,000. Bly & Hamann, 551 Nostrand Ave., archts. Noted Dec. 18.

O., Middletown—PAPER BAG FACTORY—Jan. 13, by Lockwood, Greene & Co., archts., Hanna Bldg., Cleveland, 1 story, brick, steel, concrete, 110,000 sq.ft. floor space, for Raymond Paper Co. $150,000. Noted Oct. 30.

Pa., Glenfield — BASKET FACTORY — See "Contracts Awarded."

CONTRACTS AWARDED

Calif., San Leandro — FACTORY — Wurm Woven Hosiery Mills, 114 13th St., Oakland, 1 story, 60 x 108 ft., brick, steel, to D. Caminetti, 2212 21st St., Oakland.

Ill., Chicago—STEEL PRODUCT PLANT—Midland Specialties Co., 536 West 25th St., steel product manufacturing plant, to Austin Co., 16112 Euclid Ave., Cleveland, O. Est. exceeds $140,000.

Ill., Chicago—PLANT—Midland Specialties Co., 536 West 25th St., 1 story, 84 x 130 ft., steel, frame, block 4700 South Richmond St., to Austin Co., 510 North Dearborn St. Est. $50,000.

Factories and Mills (Continued)

Ill., Galesburg—FACTORY, etc.—Rowe Mfg. Co., 1 story, 112 x 126 ft. wood frame factory, 30 x 30 ft. brick power and heating plant, West 3rd St., own forces.

Ind., Evansville—PLANT—Lincoln Oil Co., Robinson, general contract rein.-con., brick, steel, Illinois and Sherman Sts., to Long & Smith, 702 Lincoln Ave. Est. $47,000.

Mass., Brockton — ICE HOUSES — Brockton Ice & Coal Co., rebuilding ten 1 story, 120 x 150 ft. ice houses, timber, at Thirty Acres Pond, recently destroyed by fire. Owner builds. To exceed $40,000. Private plans.

Mass., Natlick—ICE PLANT—Framingham & Natick Ice Mfg. Co., c/o J. A. Hill, 90 Pond St., 1 story, 60 x 110 ft., 75 x 95 ft., brick, steel artificial ice plant, storage and office, concrete found., separate contracts. $75,000. C. Coneby Eng. & Constr. Co., 1580 Ansol Rd., Cleveland, O., engrs. Formerly reported as J. Hill owner. Noted Oct. 2.

Mass., Somerville — LAUNDRY — A. MacNaughton, archt., 131 Highland Ave., Arlington, altering and constructing 1 story, 60 x 110 ft., brick, steel addition, plain found., 154 Cedar St., to C. C. Temple Co., 99 Chauncy St., Boston, for White Cross Laundry Co. $40,000. Noted Sept. 4.

Mich., Saginaw—FOUNDRY—General Motors Corp., General Motors Bldg., Detroit, foundry, to Austin Co., 16112 Euclid St., Cleveland, O. Est. exceeds $50,000.

N. J., Cranbury—FACTORY—Unexcelled Mfg. Co., Inc., T. Jardine, pres., 22 Park Pl., fire works factory, day labor and separate contracts. To exceed $40,000. Noted Nov. 13.

N. J., Newark—PRINTING PLANT—Wolber Holding Co., DeVoise Bldg., general contract 1 story, basement, 50 x 160 ft., brick, steel, plain found., to J. F. Mitchell Co., 30 Church St., New York. Est. $40,000.

N. J., Old Bridge — YEAST PLANT — Anheuser-Busch, Inc., 721 Pestlozi St., St. Louis, Mo., general contract 4 story, basement, 100 x 100 ft. brick, steel, to Stone & Webster Eng. Corp., 120 Bway., New York. Est. $2,000,000. Noted Nov. 6.

N. Y., Jamaica—PUBLISHING—Long Island Daily Press Publishing Co., 3 story, 55 x 140 ft. publishing and industrial building, to E. G. Vail & Son, 153 Pierrepont St., Brooklyn. Est. exceeds $40,000. Noted Dec. 11.

O., Cleveland — OIL REFINERY IMPROVEMENTS — Standard Oil Co. of Ohio, Midland Bank Bldg., oil refinery improvements, incl. nine 3,000 bbl. oil storage tanks, Bway. and East 34th St., to Chicago Bridge & Iron Co., Union Trust Bldg. Est. $175,000. Owner soon takes bids structural steel loading racks.

Pa., Glenfield — BASKET FACTORY — Allegheny Basket Co., D. W. Steel, pres., 1228 Irwin Ave., Pittsburgh, 2 story, basement, 100 x 150 ft., brick, steel, Dawson Ave., separate contracts. $40,000. Private plans. Start work soon. Concrete driveway, built-up roofing.

Tex., Beaumont—PAINT and TILE PLANT—P. N. Anger & Associates, 660 Prairie St., plant to manufacture paint and tile from magnesite, magnesium, chloride compounds. Private plans.

Tex., Edinburg—COTTONSEED OIL MILL—Owner, c/o B. Hudgins, secy. Chamber of Commerce, preliminary surveys cotton-seed oil mill plant, 50,000 tons cotton-seed annual output. $75,000.

Tex., Liberty—TOOL FACTORY—Texas & Louisiana Tool Co., Liberty, Tex., and Baton Rouge, La., tool making factory.

Wis., Milwaukee—LAUNDRY—Amer. Linen Supply Co., 829 North Franklin St., Chicago, Ill., general contract 1 story, basement, 140 x 160 ft., brick, rein.-con., plain found., North St., to E. Steigerwald & Sons, 5310 State St.

Ont., Tavistock—MILLING PLANT—Vitamin Milling Co. of Canada Ltd., 503 McKinnon Bldg., 19 Melinda St., Toronto, 2 story, basement, 50 x 60 ft., concrete, to Pounder Bros., 45 Cambria St., Stratford. Est. $60,000. Noted Mar. 27.

GARAGES

PROPOSED WORK

N. J., Montclair — White Motor Sales, Inc., 640 Bloomfield Ave., will not build 2 story, 100 x 165 ft. garage and showroom, Grove and Glen Ridge Sts. $150,000. Former bids rejected and project abandoned. Noted Oct. 30 Daily.

N. Y., Brooklyn—A. Smith, Stillwell Ave. and Quentin Rd., sketches by Burke & Olsen, 32 Court St., 2 story, 80 x 100 ft. service garage, Stillwell Ave. and Quentin Rd. $50,000.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., plans by B. R. Swartburg, 2 West 46th St., garage at City Hospital, Welfare Island. $150,000.

N. Y., New York — Hoffman Development Corp., 147 East 51st St., bids late in fall, 7 story service garage, 232 East 36th St. To exceed $40,000. C. Schaefer, Jr., 332 East 149th St., archt. Noted Sept. 18.

N. Y., New York—Kenjohn Realty Corp., K. P. Steinrich, pres., 362 West 23rd St., sketches by L. E. Dell, Bogota, N. J., 6 story, 74 x 197 ft. service garage, 435 West 25th St. $400,000.

Pa., Pittsburgh—H. C. Clepper, archt., 103 Vandergrift Bldg., soon lets contract 1 story, brick service station, Penn and Main Sts., for Sterling Oil Co., R. S. Newton, in charge of construction., Emlenton. $40,000.

R. I., Providence—J. J. Hahn, 323 Angell St., plans by W. R. Walker & Son, 49 Weybosset St., 1 and 2 story, brick, concrete, steel service garage and sales addition, plain found., Fountain and Empire Sts. $40,000 or more.

BIDS ASKED

Conn., Waterbury—Kaplan Bros., 352 East Main St. taking bids 1 story, basement, 50 x 110 ft., brick public auto service and sales garage, East Main St. $40,000. T. M. Freney, 69 Center St., archt. Noted Dec. 25.

CONTRACTS AWARDED

Conn., Hartford—Goodrich Silvertown Co., 145 High St., 1 story, basement, mezzanine, 30 x 128 ft., 50 x 70 ft., brick, concrete service station, to Allyn Wadhams Co., 15 Lewis St. Est. $40,000. Noted Dec. 11.

Mo., St. Louis—Goodrich Silvertown, Inc., c/o R. E. Kenner, zone mgr., general contract 2 story, concrete, brick, terra cotta, super-service station on 107 x 125 ft. site, Oliver and 23rd Sts., to Austin Co., Arcade Bldg. Est. $45,000.

O., Cleveland—FACTORY—Yoder Co., H. O. Yoder, secy.-treas., 5500 Walworth Ave., 1 story, 97 x 400 ft., brick, steel, to Gillmore-Carmichael-Olson Co., 4300 Euclid Ave. Est. $200,000. Noted Dec. 11.

O., Toledo — FACTORY, etc. — Libby Glass Co., Ash St. and Wheeling & Lake Erie R.R., buildings to house 3 new blowing machines, 3 furnaces, lehrs and other equipment necessary for 40,000,000 tumblers yearly output, also new warehouse, engine room, machine shop, boiler house, producer house and batch mixer buildings, all brick, steel, 100,000 sq.ft. floor space, to H. K. Ferguson Co., Hanna Bldg., Cleveland. Est. $600,000.

R. I., Providence—Autocar Sales & Service Co., 302 Pearl St., rein.-con., brick, steel sales and service building, concrete found., to Gordon & Gordon, 15 Westminster St. Est. $75,000. Noted Dec. 25.

SHOPS AND FOUNDRIES

PROPOSED WORK

Calif., Oakland—MACHINE SHOP—J. Van Selzer, 1226 17th Ave., sketches 1 story, 50 x 100 ft., brick, 17th Ave. near East 14th St.

Ind., Lafayette—SHOP, etc.—H. H. Horner, plans by F. P. Riedel, Lafayette, 1 story, basement, 130 x 165 ft., rein.-con., brick, steel machine shop, garage, East Main St. $50,000.

CONTRACTS AWARDED

Md., Baltimore—PIPE FOUNDRY, etc.—H. C. Weiskittel Co., rein.-con., pipe foundry, pattern and machine shop, garage and gas range factory, to E. Eyring & Sons Co., 3rd St. and Fait Ave.

POWER PLANTS

PROPOSED WORK

Mass., Beverly — Gulf Refining Co., Park Sq. Bldg., Boston, 1 story, brick, boiler house, equipment, Water St. $40,000. Noted Sept. 4. Private plans.

Mass., Brookline—Edison Electric Illuminating Co., 39 Boylston St., Boston, rein.-con. sub-power station, Beaconsfield Rd. near Dean Rd. $50,000 or more. I. E. Moultrop, 39 Boylston St., Boston, engr. Noted Dec. 25.

Minn., Duluth—Duluth Steam Corp., central heating plant. $600,000.

Minn., St. Paul—City, A. J. Conroy, comr. P. Utilities, sketches power plant, Hill and Marlet Sts. $250,000.

N. Y., Bedford Hills—Dpt. Correction, State Office Bldg., Albany, bids in February, additional boiler equipment with stokers in power house and laundry building, cold storage and bakery, at New York State Reformatory for Women. To exceed $40,000. Noted Dec. 25.

O., Selby—City power plant improvements. Burns & McDonnell Eng. Co., 400 Interstate Bldg., Kansas City, Mo., engrs.

Tex., San Antonio—San Antonio Pub. Serv. Co., 201 North St. Mary's St., c/o E. H. Kifer, changes in sub-station equipment, incl. some new equipment. $350,000. Private plans.

Wash., Seattle—Bd. P. Wks. soon takes bids superstructure 60 x 224 ft. rein.-con. power house, 110 ft. from bottom draft tube to the roof, at Diablo plant. $500,000. J. D. Ross, supt. of light. Noted July 31.

Alta., Edson — Calgary Power Co., Calgary, power development on Athahasca River, northwest of here. $5,000,000.

Man., Winnipeg—Winnipeg Hydro-Electric Co., soon takes bids power plant addition. $450,000.

BIDS ASKED

Neb., Orleans—See "Contracts Awarded."

N. Y., Yonkers—See "Contracts Awarded."

CONTRACTS AWARDED

Mass., Fitchburg—Crocker-Burbank Co., 545 Westminster St., masonry for 2 story, 60 x 85 ft., brick, steel, concrete power plant, Westminster St., to Proffitt & White, 1137 Main St., Leominster.

Mass., Wellesley—Town, Water & Municipal Light Comn., W. H. Blood, Jr., 1 story, brick, steel sub-station addition, to Hill & Delaney, 108 Mass. Ave., Boston. Est. $40,000 or more. Noted Dec. 25.

Mo., St. Louis — Union Electric Light & Power Co., 12th and Locust Sts., 1 story, basement, 53 x 70 ft., rein.-con., brick, steel, terra cotta, granite sub-power station, 15th and Linden Sts., to Fruin-Colnon Contg. Co., Merchants Laclede Bldg.

Neb., Orleans—Western Public Serv. Co., c/o Division Office Scottsbluff, 35 x 70 ft. main building, 25 ft. high, with 1 story annex containing heating plant, shower bath, brick, incl. 1,050 hp. Fairbanks Morse oil engine direct connected to 720 kw. electric generator, day labor under supervision S. J. Connolly, engr. Plants & Buildings.

N. Y., Yonkers—Yonkers Electric Light & Power Co., 45 Bway., substations, transmission and distribution lines, equipment, street light improvements in Yonkers and vicinity, day labor and separate contracts. $790,500. Private plans.

WAREHOUSES

PROPOSED WORK

Calif., Tracy—Holly Sugar Co., West Channel St., Stockton, fireproof, probably rein.-con. warehouse. $150,000 or more.

N. Y., New York—Lincoln Warehouse Corp., 1187 3rd Ave., plans by G. S. Kingsley, 105 East 125th St., 14 story warehouse, bank, office, 20 East 69th St. To exceed $200,000.

N. Y., New York—Star Co., 220 South St., plans by Lockwood Greene & Co., 100 East 42nd St., 3 story warehouse and industrial building, 419 Water St. and 95 Market St. $175,000.

O., Youngstown—Shell Petroleum Co., Shell Bldg., St. Louis, Mo., distribution plant, warehouse. To exceed $100,000. **Maturity indefinite.**

Okla., Oklahoma City — K. R. McKee, 312 North Robinson St., sketches by Schumacker & Winkler, Commerce Bldg., 11 story, 140 x 200 ft., rein.-con., plain found., Walnut St. $250,000.

R. I., East Providence (br. Providence) — Artesian Well & Supply Co., c/o E. B. Whipple, engr., 87 Weybosset St., Providence, 1 story, brick, steel, storage building, concrete found., Blanding Ave. $40,000.

BIDS ASKED

Conn., Bridgeport—See "Contracts Awarded."

Mass., Watertown—Jan. 13, by New England Telephone & Telegraph Co., 50 Oliver St., Boston, and Monks & Johnson, engrs., 99 Chauncy St., Boston, 6 and 1 story, 85 x 265 ft. and wing, 120 x 140 ft. warehouse and garage, both brick, rein.-con., steel, concrete founds., Mt. Auburn and Grove Sts. To exceed $40,000. Noted Aug. 7.

N. J., Hackensack — Standard Oil Co., M. Roberts, engr., in charge, Bayway, taking bids general contract 1 story, 40 x 80 ft. warehouse, 1 story, 112 x 120 ft. garage and office, 1 story, 20 x 40 ft. pump house, on Hackensack River front. $150,000. Private plans. Noted Dec. 25.

N. J., Perth Amboy—Ballinger & Co., archts., 12th and Chestnut Sts., Phila., Pa., bids about Mar. 1, general contract 1 story, basement, brick, steel warehouse, Fayeth and Read Sts., for Greenspan Bros., 226 Washington St. Est. $150,000. Noted Dec. 25.

N. Y., New York — Port of New York Authority, 80-90 Eighth Ave., bids about Mar. 1, foundations for 14 story, 200 x 800 ft. rein.-con., brick freight terminal, 8th and 9th Aves., 13th and 14th Sts. $9,000,000. Abbott, Merkt & Co., 175 5th Ave., archts. Noted Nov. 20 under "Public."

Que., Montreal—Jan. 12, by C. B. Brown, ch. engr. (oper.) Canadian Natl. Rys., Montreal, Insurance Exch. Bldg., St. James St., fruit warehouse, between Guy and Seigneurs Sts. $300,000.

CONTRACTS AWARDED

Calif., San Francisco—H. G. Baumann, archt., 251 Kearny St., 3 story, rein.-con. warehouse, to Sommarstrom Bros., 2924 San Pablo Ave., Oakland, for Poultry Producers of Central California, 700 Front St., $140,500. Noted Nov. 20.

Conn., Bridgeport—New Era Constr. Co., R. D. Zappone, pres., 511 5th Ave., New York, storage warehouse and manufacturing plant, separate contracts. Takes bids about Apr. 1. Noted Dec. 25.

Conn., East Hartford (br. Hartford)—Texas Co., G. N. Beaton, dist. mgr., 4 concrete, brick, steel buildings for terminal, to S. Failla, 48 Haywood St., Greenfield, Mass. Est. $200,000. Noted Dec. 4.

N. Y., Long Island City—Voorhees, Gmelin & Walker, archts., 101 Park Ave., New York, warehouse, shop, to James Stewart, 230 Park Ave., New York, for Crane Co., 836 South Michigan Ave., Chicago, Ill. Est. $350,000. Contractor soon lets separate contracts, bids in. Noted Nov. 6.

Tex., Fort Worth—J. E. Quarles Lumber Co., 90 Jennings St., lumber yard, brick office, 4 frame sheds at Park Pl. and Frisco R.R. tracks, to Morgan & Goddard; painting, to Casey & Clayton, 3403 Conway St.; plastering, to J. Linquist, 1404 Virginia St. Est. $42,000.

See proposal advertising on page 79

Constr. News page 17

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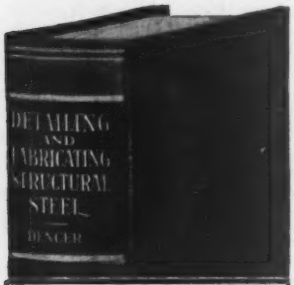

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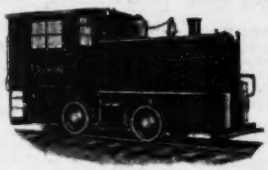

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